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The Alberta Journal of Educational Research *Vol. XXVIII, No. 3, September, 1982, 193-203*

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Children's Early Language: Egocentric or Sociocentric?

On the basis of observing children's talk, Piaget concluded that the speech of a young child is primarily egocentric, because the child talks about himself and because he does not place himself in the perspective of the listener. More recently other researchers, having studied children's spontaneous dialogue, suggest that young children's speech can be highly socialized. These studies report a high incidence of socialized speech as well as children's ability to "see the other's point of view" in children as young as two years old. In this paper, the relationship between egocentric and socialized speech is examined within the context of the social theory of language acquisition and some conclusions and implications for the classroom are presented.

In 1926 Piaget published "The Language and Thought of the Child" in which he introduced the concept of egocentrism. The following is an example of the spontaneous dialogue from which his conclusions were drawn. The main characters in this sequence are Pie and Ez, aged 6;6, students at the Maison des Petits de l'Institut Rousseau, an institution where, Piaget (1959, first published 1926) explains, "activities take place in complete freedom; no check is put upon any desire that may manifest itself to talk or play together; no intervention takes place unless it is asked for" (p. 5).

Pie (to Ez who is drawing a train-car with carriages in tow):
But the trains that are hooked on behind don't have any flags. (No answer)
(Talking about his train): *They don't have any carriages hooked on ...* (He was addressing no one in particular. No one answers him)

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(To Bea): *'T'sa train that hasn't got no carriages.* (No answer)
(To Hei): *This train hasn't got no carriages, Hei, look, it isn't red, d'you see ...* (No answer)
(Lev says out loud, "A funny gentleman" from a certain distance, and without addressing himself to Pie or to anyone else) Pie: *A funny gentleman!* (Goes on drawing his train)
I'm leaving the train white.
(Ez who is drawing next to him says, "I'm doing it yellow"). *No you mustn't do it all yellow.*
I'm doing the staircase, look. (Bea answers, "I can't come this afternoon, I've got a Eurythmic class".)
What did you say? (Bea repeats the same sentence)
What did you say? (Bea does not answer. She has forgotten what she said and gives Ro a push).
(To Bea), *Leave him alone.*
(Mlle. B. asks Ez if he would like to come with her)
Come here Ez, it isn't finished. Please teacher, Ez hasn't finished.
(Without addressing himself to anyone) *I'm doing some black stones ...*
Pretty ... these stones.
(To Ez) *Better than you, eh?* (No answer. Ez had not heard the previous remark.)

On the basis of the production of a volume of children's talk such as this, Piaget (1959) concluded that the speech of a young child is primarily egocentric, "partly because the child speaks only about himself but chiefly because he does not attempt to place himself at the point of view of his hearer" (p. 9). It is at a much later stage of development, that of "adapted information" that the child is able to speak from the point of view of his audience and qualify, in Piaget's terms, as a socialized speaker.

Nelson and Gruendel (1979) taped children's conversations at day care centres. The following is a conversation between two girls (G-1 and G-2 aged 4;4 and 4;8 respectively) who are cutting cookie shapes out of play dough and discussing a daily occurrence — mealtime.

G-1: And also, at night time, it's suppertime.
G-2: Yeah, at night time, it's suppertime. It is.
G-1: It's morning.
G-1: It's morning.
G-2: At morning, it's lunchtime! (emphatic)
G-1: At morning we already had breakfast. Because at morning it's lunchtime.
G-2: RIGHT! (emphatic)
G-1: Yeah, at morning, it's lunchtime.
G-2: At morning, it's lunchtime.
G-1: But FIRST comes snack, then comes lunch.
G-2: Right ... Just in school, right?
G-1: Yeah, right, just in school.
G-2: Not at home.
G-1: Well, sometimes we have snacks at home.
G-2: Sometimes.
G-1: Sometimes I have snack at home.
G-2: Sometimes I have snack at my home, too.
G-1: Uh-hum. Because when special children come to visit us, we sometimes have snack. Like, like, hotdogs, or crackers, or cookies, or, or, something like that.
G-2: Yeah, something. Maybe cake. (Laughs)

G-1: Cake.
G-2: Cake. Yeah, maybe cake.
G-1: Or maybe, uh, maybe, hotdog.
G-2: Maybe hotdog.

Sustained exchanges like this in spontaneous dialogue led Nelson and Gruendel (1979) to suggest that young children's speech can indeed be highly socialized. Their findings appear to question Piaget's conclusion that children's thought and language for the first seven years of life are largely egocentric.

These two conversations were chosen as discrete and extreme examples of the type of language possible in young children. The "egocentric" Pie in Conversation 1 was some two years older than the "socialized" participants in Conversation 2. It is our purpose in this paper to investigate this apparent anomaly of findings as they relate to Piaget's original definition of egocentrism and to the subsequent development of language learning theories. The overall purpose is not to view current research as validation for the rejection of Piaget's theory but to determine the manner in which his theory can be restated in light of subsequent research findings.

In an attempt to explain the differences between the two examples of children's talk, the focus of this paper will be on three areas of discussion:

(a) Egocentrism: The original definition
(b) The relationship between egocentric and socialized speech
(c) A re-examination of stages of development from egocentric to socialized speech.

(a) Egocentrism: The Original Definition

Piaget defined egocentrism essentially as that which the child could not do, that is, assume the point of view of his listener. In the example provided, Pie engages in repetition, monologue, and, briefly, in collective monologue with his friend Ez. None of the forms he employs results in a response. When he repeats "It's a train that hasn't got no carriages," and receives no reply, his interest shifts to his activities with his own picture. Similarly he does not pursue his question to Bea, "What did you say?" What is assumed by an observer is that no reaction was evoked and none was expected. One reason Piaget (1959) offers for the continuous dialogue is that the child is possessed of "verbal incontinence" (p. 38) so that he utters everything that comes into his head regardless of its appropriateness or social applicability. All this is exemplified in the first conversation in an activity that Piaget refers to as potentially sociable since Pie is engaged in drawing at the same table as his bosom friend Ez in a very informal educational setting. In his findings Piaget calculated that repetition monologue and collective monologue as spoken manifestations of egocentric thought accounted for 44-47% of the child's total output.

Nelson and Gruendel's (1979) study differs in some ways from Piaget's example. Only two students are involved in the Nelson and Gruendel study and they are sharing an activity. In Piaget's example the children all appeared to be absorbed in individual activities. However in both cases a natural situation and spontaneous dialogue on the part of the children is assumed. The most obvious feature in Nelson and Gruendel's example is repetition but unlike the repetition in Piaget's study, this repetition leads somewhere because the flow of conversation is maintained. Keenan (1977) in a comprehensive study on repetition based on

observation of her twin boys, found that repetition may in fact reflect the child's competence particularly at times when the child repeats selectively. She affirmed repetition as a component of the learning process in the following way.

> We can say that in repeating, the child is learning to communicate. He is learning not to construct sentences at random, but to construct them to meet specific communicative needs. He is learning to query, comment, confirm, match a claim and counter claim, answer a question, respond to a demand and so on. In short he is learning the human use of language, what Dell Hymes has called communicative competence. (p. 133)

This concept of repetition is partly exemplified in the second conversation where a repetitive dialogue is able to advance from an apparent standstill.

> Well sometimes we have snacks at home. Sometimes. Sometimes I have snack at home. Sometimes I have snack at my home too. Uh hum. Because when special children come to visit us we sometimes have snack.

It will be noted that in this excerpt each repetition is either a reduction or expansion of the preceding comment. Nelson and Gruendel's interpretation of repetition is that it serves two purposes "one structural — to maintain the dyadic flow — and the other substantive — to affirm understanding and resolve uncertainty and disagreement" (p. 82). Both Nelson and Gruendel (1979) and Keenan (1977) define repetition within a social context. Piaget's view of repetition is clearly nonsocial. He sees repetition (echolalia) as a conflict between "I and the not-I" (p. 11) where no adaptation takes place and where the child is merely repeating for the sake of repeating.

Beyond repetition the overriding reason offered by Nelson and Gruendel for the success of their example is that the dialogue involved the sharing of "script" information. It is their hypothesis that a child acquires knowledge about routine events such as bedtime, meal time — child events that recur with marked regularity in their lives. The resulting conceptual structures are stored in long term memory and retrieved when required. The "script" involved in the second conversation was mealtime. "Script" originates in the work of Schank and Abelson (1977) whose studies in memory reflect a pragmatic base. They have summarized their theory in the following way.

> An episodic view of memory claims that memory is organized around personal experiences or episodes rather than around abstract semantic categories. If memory is organized around personal experiences then one of the principal components of memory must be a procedure for recognizing repeated or similar sequences ... some episodes are reminiscent of others. As an economy measure in the storage of episodes, when enough of them are alike they are remembered in terms of a standardized generalized episode which we will call a script. (pp. 17, 19)

This explanation is insufficient to explain why the two participants were able to sustain an exchange on mealtime. A further requirement was that the children share the script in order to be able to accommodate each other's point of view. This explanation is not dissimilar to Piaget's description of stage 2A of his stages of development from egocentric to specialized speech, "Collaboration in Action", where speakers do indeed collaborate and share a "common memory" (p. 63).

On the basis of their findings, Nelson and Gruendel have redefined egocentrism in the young child as a "misplaced assumption of shared context by either or both participants in a dialogue" (p. 77). On the one hand, that refers to the lack of "script sharing." But it can also refer to the child's lack of knowledge of conversational structure such as turn taking, repetition, or questioning for

clarification. The implication then is that the lack of success in the first conversation could have been due to factors other than a state of egocentrism.

The Nelson and Gruendel study has focussed primarily on the socialized speech of the child. No tables are provided to indicate the distribution of socialized and egocentric speech. However, the examples provided suggest a high incidence of socialized speech. Other studies have explored "seeing the other's point of view" and produced evidence which appears to support Nelson and Gruendel's findings.

Borke (1971) conducted a study designed to ascertain children's affective responses as a measure of their ability to take another's point of view. The children, ages 3-8, were presented with a series of short stories. They were asked to indicate how the child in each situation felt by selecting a happy, sad, afraid, or angry face to complete the picture accompanying each story. Thus their response was behavioural rather than verbal. This removed the possible impediment of lack of knowledge of conversation structure referred to above by Nelson and Gruendel. The findings showed that while children's sensitivity increased with age, even 3-year-olds were able to show an awareness of another's viewpoint and could identify the specific situations that evoke different kinds of affective responses. Thus while the child may have lacked the communication skills to indicate knowledge of another's point of view; from a behavioural base he was able to accomplish the task.

Borke's study was unique because it partialled out possible structural difficulties which may have interfered with the children's responses. However, other studies incorporating verbal responses have also been able to record successful findings. Mueller (1972) concentrated on the interpersonal consequence of children's speech. He found that 85% of all utterances made by 24 pairs of children, 3½ to 5½ years of age, received replies or at least engaged the listener's attention. In a similar study Garvey and Hogan (1973) working with 18 children, aged 3½ to 5½ years, obtained results showing that children were mutually engaged for 66% of each session, that is, the child was able to adapt to the speech and nonverbal behaviour of his partner.

Alternative methods of focussing on "seeing the other's point of view" included studies where the effect of situational change was studied, for example, the effect of changing the age of the listener. The following sample is taken from a study conducted by Shatz and Gelman (1973) in which a 4-year-old is engaged in the same toy-task dyad, first with mother and then with a 2-year-old sibling.

> *J.K. to Mother:*
> You put it in here. And then push it all the way in and then you get marbles out here. You'll need gas. It only has enough gas to get to the gas station. It backed in here. That's good.
>
> *J.K. to 2-year-old:*
> I gave you it. You want to have something funny? Put the marbles in here. Put the marbles in here. I'll give you the marbles. Now pour them in here. Go up here and pour them in here. Now we have to dump it. Dump it. No, not in here. Pour it in here, okay? (p. 8)

Note the shortened sentences in the second situation. In this study the mean length of utterances to the adult was 67.7 words while mean length of utterances to the younger child was 34.1 words. Thus the child was able to perform successfully in changing his perspective. A study by Sachs & Devin (1976), in

which children were asked to adjust their speech to an adult, peer, and baby doll, yielded similar findings. In talking to the baby doll, each child employed some of the characteristics that have been found in mother's speech to children, such as simplification and repetition.

One further method used to study children's speech in this context was an analysis of the structure of egocentric and social speech. Pellegrini (1980) placed 4- to 5-year-old children in situations conducive to either egocentric or socialized speech. His analysis of the discourse structure of both forms of speech showed no differentiation.

This review of some of the approaches which have been used in the study of socialization in the young child seems to call to question Piaget's assertion that this kind of sociability is, in the main, absent from the child's life for at least the first six years of his life. A general interpretation of Piaget's theory has been that egocentrism and socialization are in fact mutually exclusive. Garvey and Hogan (1973) have suggested that it might be useful to regard children as "sociocentric" rather than egocentric, that is that they are always aware of and react to the social context in which they live.

(b) The Relationship Between Egocentric and Socialized Speech

The foregoing research with its focus on the socialization of children's speech has ignored egocentric speech as if it is scarcely present in a child's language. Such is not the case. The following example recorded by Keenan and Klein (1975) in a study of three-year-old twins had been categorized as "irrelevant responses" rather than egocentric speech.

Speaker 1: goosey goosey gander

Speaker 2: moth moth

Speaker 1: goosey goosey gander where shall I wander

Speaker 2: moth moth moth

Speaker 1: upstairs downstairs in the lady's chamber

Speaker 2: moth moth moth

Speaker 1: moth

Speaker 2: gone moth all gone

It is only in the last exchange that the script is shared. All preceding exchanges are examples of collective monologue.

While egocentric speech is obviously present in current studies being reported, the controversy seems to be not in its presence but in Piaget's assertion that to be egocentric is to be nonsocial, that egocentric and social speech are polar opposites. For this reason Keenan and Klein (1975) and Nelson and Gruendel (1979) have sought substitute words to describe egocentric.

The basis for their reluctance can be found by briefly reviewing the social theory of language. De Laguna (1963, originally published 1927) remarked that the most likely evolutionary explanation of language lies in the human need for help. Bruner (1972) hypothesized that "the initial use of language is probably in support

of and closely linked to action" (p. 700). The action to which Bruner (1975) refers is joint action undertaken by the child and another, usually the mother. Hence initial action is social. Mead (1934), Vygotsky (1962), Halliday (1975), and Ervin-Tripp (1977) are among the theorists who have drawn attention to the child as being social essentially from birth. If this is the case, then the insertion of a nonsocial stage (egocentrism) in the development of this social being appears incongruous. It is to this point that researchers have alluded in their questioning and doubt about egocentrism. Can egocentrism exist within the social theory of language acquisition?

Vygotsky, in confronting this problem, found one solution. He supported Piaget's theory of the existence of egocentrism and used it to develop his own theory concerning inner speech. Where Piaget's egocentrism disappeared once the child was fully socialized, Vygotsky saw egocentric speech as a "transitional stage in the evolution from vocal to inner speech" (p. 17). Thus the inner speech of the socialized child or adult was egocentric speech rendered inaudible. He did however recognize the social nature of speech and, the social nature of egocentric speech.

> We consider that the primary function of speech in both children and adults is communication, social contact. The earliest speech of the child is therefore essentially social. At a certain age the social speech of the child is quite sharply divided into the egocentric and communicative (we prefer to use the term communicative for the form of speech that Piaget calls socialized as though it had been something else before becoming social). From our point of view the two forms, communicative and egocentric are both social though their forms differ. (p. 19)

Vygotsky, in changing the term "socialized" to "communicative" makes a considerable contribution to the interpretation of Piaget's stages of development. Within this context egocentrism may be seen as noncommunicative rather than nonsocial, which is an important distinction.

It must be added that Piaget himself did not originate the narrow definition that has been attributed to him. For example, having described the nature of the child's "collective monologue," Piaget goes on to say "His language only begins to resemble that of adults when he is directly interested in making himself understood, when he gives orders or asks questions" (p. 40). While intellectual processes remain egocentric "all the language that is bound up with action, with handicraft and especially with play will tend to become more socialized" (p. 43). However, Piaget draws distinctions between intellectual, social, and verbal egocentrism. While social and verbal egocentrism are subject to social and cultural influences, intellectual egocentrism is seen by Piaget to be "an unconscious illusion, an illusion of perspective" (p. 268) and, hence, part of the child's cognition. This distinction has not been made by researchers who have continued to apply a general definition to egocentrism. Piaget has engaged in numerous reprimands of his critics in attempting to justify his original stance. One such criticism is this:

> If we give the word egocentrism its generally accepted meaning, that of conscious self preoccupation, which precludes a feeling for the community, the word is clearly being given contradictory meanings. But if we use this word egocentrism to describe something purely epistemic to denote the confusion of subject with object during the act of acquiring knowledge, in which the subject does not know himself and, in turning towards the object, is unable to centre himself, then egocentrism and a sense of community are so little opposed to each other that they often constitute one and the same phenomenon. (p. 274)

While different interpretations and Piaget's own justifications have largely clarified the definition of egocentrism, the explanation has been provided after the fact: the fact being that the findings of Piaget's first classic study as exemplified in the first conversation have basically shaped the applied theory of social language for several decades, and delayed investigation into early child socialization. It will be noted that the studies cited in this paper have all been conducted in the seventies and constitute a new but growing body of research.

(c) A Re-Examination of Stages of Development From Egocentric to Socialized Speech

While some evidence has been provided to justify the existence of a broadly defined egocentrism within a social context, there yet remains consideration of the stages of development from egocentric to socialized speech. Piaget has identified the following stages:

Stage 1 - Collective monologue

Stage 2A - Agreement — speaker talks about himself but associates it with his listener or collaborates in action

or

Stage 2B - Disagreement — speaker talks about himself but can associate himself mentally with others and criticize or abuse them

Stage 3A - Collaboration in abstract thought

or

Stage 3B - Genuine argument

Piaget insists that, while there was no a priori reason why these stages should appear in this particular order, in fact progression does take place according to age and in the order indicated above.

The question has been asked whether in fact children's socialized speech does evolve in clearly marked stages. For example, if the two girls in the second conversation showed unmistakable signs of socialization, does this mean that they are now fully socialized and will behave accordingly in any given situation? If, in a different situation, they demonstrate a great deal of egocentrism, can this be considered regression?

Cazden (1972) has drawn attention to the manner in which a child's language develops within a social context rather than a vacuum. The child learns the social situation of his world and from this knowledge is able to differentiate ways of speaking. This explains the child's ability in the Shatz and Gelman (1973) and the Sachs and Devin (1976) studies to adapt his language when placed in different situations. Hymes (1972) has described the conventions it is necessary to learn as a member of a speech community.

> In order to compare events within a society and across societies some concise and standard formats are needed. Comparison cannot depend upon memorization or shuffling of prose paragraphs vastly different in verbal style. And it is through some form of formal statement that one can commit oneself to a precise claim as to what it is a member of society knows in knowing how to participate in a speech act. (p. 66)

What the child as a member of the speech community needs to learn then is "communicative competence." This determines the extent to which the child will be socialized in any given situation. In the second conversation, for example, communicative competence was achieved through a shared script and knowledge of conversational structure. This is not to say that global communicative

competence has been achieved, rather that it occurs only in these instances where all necessary conditions have been satisfied.

A group of studies in child speech has used as its base Hymes' theory of communicative competence. Thus the bias is a sociolinguistic one with its emphasis on the production of socially appropriate language. Many of the studies cited in this paper have used Hymes' theory as their main referent. This serves to explain more fully the gulf that exists between Piaget's psychological base and the current sociolinguistic perspective. It suggests a need for separate definitions of egocentrism to accommodate each discipline.

Braunwald (1980) has reported a study in which an attempt has been made to accommodate egocentrism in a communicative competence model. In her research, based on the study of her two young daughters, Braunwald developed a range of language use model rather than a stage model of egocentric speech. In rejecting the stage model, Braunwald sees each speech form as "a prototypical pattern of language use that defines a benchmark along a continuum" (p. 3).

The speech forms that Braunwald defines are:

1. Private — not directed to an outside or real world listener (Akin to Vygotsky's inner speech).
2. Egocentric — directed to a listener but with no intellectual desire to exchange information.
3. Social — interactional contact with no effort to exchange thoughts.
4. Socialized — assuming another's perspective.

It can be seen that there is little variation between these and Piaget's definitions. Braunwald has cautioned that these forms be seen not as a taxonomy of discrete categories but as a "heuristic for recognizing and explaining prototypical patterns of variation in the general form of children's speech" (p. 11).

Braunwald's hypothesis has been derived from Hymes' theory of communicative competence. In her model the child at any given point in development is not purely in a stage of egocentric speech. He is competent in some communicative contexts and not in others. But his competence or lack of it is not a function of his stage of development but of his ability to cope linguistically with the demands of that particular situation. This range of language use model can adequately account for the performance of the children cited in this paper.

In attempting to account for the process of socialization that occurs, Braunwald has identified two types of decentering:

a. Symmetrical decentering. In this the participants have a knowledge base that is comparable. The two girls in the second conversation can be accounted for with this description of decentering.
b. Asymmetrical decentering. Here there are either developmental or experiential differences in the knowledge base. The less knowledgeable participant has to shift upward while the more knowledgeable has to shift downward. The result is a variety of egocentric speech particularly for the less knowledgeable participant.

Braunwald has provided a useful model for reconsidering Piaget's stages of development within a sociolinguistic context. Instead of a hierarchical structure which characterizes Piaget's model, a continuum with communicative competence as the referent describes the child's socialization into the speech community. This

is not to say that Piaget's model has been totally accommodated, for Piaget's studies were primarily concerned with the development of the child's intellectual egocentrism as expressed in his speech rather than the social acquisition of communicative competence.

Implications For The Classroom

An initial caution which must be expressed is that studies in the socialization of children's speech as described in this paper have a short history. Therefore it may be premature to speculate on implications for the classroom. The area which stands to be affected most powerfully is the kindergarten curriculum. While controversy does surround the degree of formal literacy which should be introduced at the kindergarten level, little has been said about the role of speech in this context. One of Piaget's greatest contributions to the kindergarten classroom has been the concept of stages of development in children's cognition and, in particular, the development of speech. The kindergarten child has been considered essentially egocentric and, as with Pie and Ez in the first conversation, little attempt has been made to organize the child into more socialized activities. The emphasis has been on natural development through each stage. What seems to be suggested in the research findings of this paper is that, although the child is developing naturally, the context in which this is occurring is a social one. Because of this the child is required to interact and respond as a member of a speech community using whatever knowledge or competence he possesses.

One outcome of this research is a reconsideration of the kindergarten environment. In setting up an environment for an essentially egocentric child, many individual activities are considered. If the focus shifts to a social child who engages in egocentric speech as one of a range of speech forms, then the emphasis would be on the provision of a range of activities to accommodate both the egocentric and the socialized aspects of the child's development.

There is inherent danger in this recommendation. Because of the undoubted current emphasis on socialization, the egocentric nature of the child could be ignored. This raises the possibility of research which would be useful to the kindergarten teacher. For example what proportion of egocentric and socialized speech exists in the average kindergarten classroom? It would also be of value to see if a pattern exists in the types of speech events or situations which encourage a five-year-old to behave in an egocentric or socialized manner. This kind of information could serve as a lead-in to a consideration of what constitutes an appropriate learning environment for the kindergarten child of the 80s.

Conclusion

The focus in this paper has been on a reconsideration of Piaget's original theory of egocentrism. One major finding has been that it was not egocentrism which was later questioned but its relationship as a nonsocial state to socialized speech. Despite Piaget's distinction between egocentricity of thought and speech and Vygotsky's later clarifications, a generalized interpretation of egocentrism has persisted for several decades. Recent studies in child socialization were born out of the need to indicate the essentially social nature of the child. The current definition of egocentrism may indeed be "sociocentric" or context influenced because of its particular bias, but it represents an evolution of Piaget's definition which was originally grounded in intellectual egocentrism.

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Nigerian Elementary Children's Interests and Concerns

The purpose of the study was to identify and analyse the interests and concerns of Nigerian elementary school students. A six-item questionnaire was given to 528 children age 7 to age 13. The items were designed to determine children's interests (curiosity, wishes, favorite activities) and children's concerns (aversions, worries, fears). They were most curious about biological functioning, wished most for personal possessions, and their favorite activity was outdoor play. They were most concerned about injustice and aggressive behavior and most worried about the supernatural. Age was found to be the main determinant of differences in the stated interests and concerns of the children.

The purpose of the study was to identify and analyse the interests and concerns of elementary school pupils in Anambra State, Nigeria.

A knowledge of children's interests and concerns is essential to the curriculum planner to enable him to produce a functional elementary curriculum, to the teacher educator so that he can suggest an effective teaching mode for prospective teachers, and most important of all to the classroom teacher so that he can plan classroom activities both challenging and appealing to pupils.

Background

This study was done in Anambra State, Nigeria, where elementary education is free though not compulsory. The curriculum is heavily dependent on the official "Elementary School Syllabus" issued by the State Ministry of Education. This syllabus details the subjects according to grade levels and suggests approaches that could be used. Textbooks, when available, are provided, but evaluation procedures, teaching aids, and materials are handled by the heads of schools and their teachers in collaboration, sometimes, with local ministry officials.

In some ways, many of the social features observable in North America about the middle of this century appear to be present in today's Nigeria. The considerable post World War II migration of Eastern Europeans into North

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America led to a period of social uncertainty and confusing standards which took a while to sort out. In 1970, Nigeria emerged from a thirty-month civil war which involved large movements of people before and after the war. Thus the last decade has been spent in rehabilitation. Meanwhile, Nigeria's colonial past has left a heritage of considerable ambivalence and confusion as to whether social standards should be African or Euro-American. Again great increases in urban expansion were recorded around the middle of the 20th Century in North America. Similarly, Nigeria's post-civil war decade has witnessed phenomenal population shifts from rural to urban centres. Another striking similarity between North America three decades ago and Nigeria today is observable in the influence of mass media. For instance, though television is quite common today in Nigeria, it is largely an urban luxury, as are newspapers. Radio, however, is an exception, serving rural communities and much enjoyed there.

On the bases of the similarities discussed above, it would be justifiable to suggest that the social influences on North American children during the 1940s and 1950s would approximate those of present day Nigerian children, thus their interests and concerns would be similar.

Literature Review

Though interests, including wishes on the one hand, and concerns on the other might appear to be opposites, each can constitute a source of motivation. The utilization of children's interests as motivation for learning has been acknowledged as of prime importance because learners learn more easily those things that interest them. It was Dearden (1971) who observed that the motivational problems in teaching occur precisely because children are regarded as needing something in which they have not shown voluntary interest, hence the importance of interest in teaching and learning. As for wishes, they can reveal valuable information about a learner's personality, interests, and ambition. Zeligs (1942) commended the wish as a useful instrument for studying character and personality. Concerns include those happenings which make a person uneasy so that the concerns of a learner are just as important as the interests.

Although this research was done in Nigeria, the bulk of the following review is based on studies carried out with American children in the United States. This is because only one study was found (Crippen, 1973) in which African children were used in an investigation similar to the one being described here. A brief definition, then reviews of research on interests, wishes, and concerns follow.

Interests were defined as objects, relations, skills, goals, and activities that actively engage one's selective attention (Kopel, 1973). Concern was described as an uneasy state of blended interest, uncertainty, or apprehension. Interests permeate a person's life style and uniquely depict the personality of the individual. Such factors as skill, age, sex, and social class were among those identified as related to the types of interests a person can develop (Kopel, 1973). Thus, in origin, interest is linked to basic human needs, though in manifestation it is quite different. Research in interests represented by curiosities, wishes, and favourite activities is now reviewed.

A great deal of variety was reported in studies of children's curiosities (Baker, 1945; Byers, 1964). Nature, animals, and plants were frequently mentioned as arousing curiosity in younger children, while older children, especially those nearing puberty indicated interest in personal and social relationships (Beggs, 1939; Crippen, 1973; Rudman, 1955). Studies of children's wishes showed the wish

for personal possessions predominating for younger children (Boynton, 1936; Milgram & Riedal, 1969) while older children's wishes related more to the future, school success, and social relationships (Gray, 1944; Zeligs, 1942). Watching television was reported as the favourite activity engaging the greatest amount of the out of school time of American elementary school children (Bailyn, 1959; Larrick, 1977; Witty, 1961; Witty & Kinsella, 1962). Group outdoor play, games of various types, and club activities were among other favourite pursuits reported in the literature (Forster, 1930; Furfey 1930; Gessell & Ilg, 1964).

Regarding children's concerns, the following trends were reported: children's aversions were strongest to spanking, unjust blame or punishment, and making parents unhappy (Zeligs, 1945). It was noted that older children showed more aversion to disturbance of personal/social relationships than did younger children (Jersild, Markey & Jersild, 1933).

Among younger children, fear of animals was the dominant source of apprehension (Crippen, 1973; Maurer, 1945; Witty, 1961) but as children grow older, naked fear changes to worry. Thus for older children, worries about the future, school work and social relationships were the major sources of concern reported (Angelino & Mech, 1956; Pintner & Lev, 1940; Zeligs, 1940).

Methodology and Design of Study

The study sample consisting of 528 subjects between the ages of 7 and 13 contained equal numbers of boys and girls, rural and urban pupils and children representing a younger and an older age set. A six-item open-ended questionnaire containing three indices (curiosities, wishes, and favourite activities) for measuring interests and three indices (aversions, worries, and fears) for measuring concerns was used to gather data from the children by means of personal interviews. The responses to each index were grouped into categories which were developed during a pilot study. The influence of three variables (age, sex and physical location) on the children's responses was examined. χ^2 was applied within each subgroup to examine variable differences under each category.

Findings and Discussion

Curiosities

From Table 1 totals, it can be observed that the subjects showed greatest curiosity about biological followed by physical and then natural/religious issues. Curiosity in certain categories was influenced by physical location, since urban children showed significantly more curiosity about technology and applied science, while rural children were significantly more curious about biological and natural matters.

Many of the responses recorded under this index portray an active awareness by the children of their surroundings and a genuine effort to explore. Granted that the relatively more conservative Nigerian socio-cultural situation might discourage inquisitiveness in children, the range and breadth of expressed curiosity was quite considerable. Questions of a biological nature, which had the highest frequency, contained a large number dealing with man, his origins, childbirth, and the like. Older girls showed particular interest in such issues. One can speculate that with little use of visual and illustrative materials such as television and film-strips in schools, and granting that certain communities might be uneasy about openly discussing human biological issues, these Nigerian subjects

might indeed lack essential basic information about their own bodies. Biological curiosity among American children seemed to be more about lower animals than about man.

Reports of curiosity about supernatural/religious issues were not as frequent or as persistent among American children as among the subjects of this study. Lack of scientific education among parents, leading to various degrees of superstition within the family might partly account for this phenomenon. This line of thought appears to be supported by results obtained by Crippen (1973) who found curiosity about religious issues high among Kenyan elementary school pupils.

Wishes

The most commonly expressed wishes, as can be seen from Table 1, were for personal possessions, followed by those connected with vocations and future careers, and then school success. Significant differences were noted between the age sets. Younger children made significantly more wishes for personal possessions while older children and boys expressed significantly more wishes about vocations and future careers. Older children also expressed significantly more wishes to be good. Significantly more rural children wished to live long.

Evidence from the literature and from this study suggest that wishes for personal possessions are common to children across culture, though there appears to be a difference in types of personal possessions desired. American children seem to wish for such things as dolls, pet animals, and toys whereas these Nigerian children's wish for clothes, television, money and the like, suggests more adult influence. It no doubt reflects the materialistic value currently common in Nigerian society.

Another feature worth noting is the high frequency of school success wishes in this study in contrast to American studies. Success in school is highly rated among Nigerians as a means to improve social and economic standing. Whereas every American child takes education for granted, such is not the case for Nigerian children, who go to school at considerable expense and inconvenience to parents.

The wish to be good, found in this study but not reported in literature dealing with American children, is almost certainly attributable to the greater emphasis in Nigerian childrearing practices on such "good" virtues as obedience, peaceful co-existence, and being each other's keeper. Those are the attributes of a good child in our culture. The wish to live long also has a deep cultural root. Many Igbo names and proverbs such as Ndubuisi (life is supreme) attest to the value attached to the ability to survive.

Favourite Activities

The results from Table 1 show that the favourite out-of-school activity of the Nigerian subjects was outdoor play. This contrasts with the results of similar studies in the United States which show that the favourite out-of-school pursuit of American school children was watching television. The frequent reference to the importance of school and studying found in the subjects' responses in the present study also contrasts with results of studies using American children. Age was an important factor in the results of this index, as was sex. Significantly more responses naming reading and studying as favourite activities were made by older children, while significantly more responses naming house chores as a favourite activity were made by girls. In neither case is the finding a surprise; they conform to social expectations. Interest in making things as a favourite activity was low, which is surprising since Nigerians operate in a basically manual environment.

TABLE 1

CHILDREN'S INTERESTS AND CONCERNS: VARIABLE RESPONSE FREQUENCIES AND CHI SQUARE BY AGE SET, SEX AND LOCATION

Indices and Categories	Age			Sex			Location			
	Younger N	Older N	χ^2	Boys N	Girls N	χ^2	Urban N	Rural N	χ^2	TOTAL
Curiosities (Critical χ^2=5.99)										
Technology & applied science	107	106	.00	112	101	0.54	128	85	8.68*	213
Biological phenomena	245	222	1.14	229	238	0.16	201	266	9.04*	467
Physical phenomena	173	163	0.28	161	175	0.58	170	166	0.04	336
Human & animal behaviour	73	79	3.92	79	93	1.12	84	88	0.37	172
Supernatural/religious	97	134	5.92	130	101	3.64	129	102	3.15	231
Misfortunes & accidents	17	18	0.28	16	19	0.25	20	15	0.71	35
Miscellaneous	2	10	5.32	2	10	5.33	4	8	5.33	12
Wishes (Critical χ^2=6.98)										
Personal possessions	391	243	34.54*	331	303	1.23	321	313	0.10	634
Success in school	82	97	1.25	77	102	3.49	85	94	0.45	179
Travel	81	66	1.53	62	85	3.59	82	65	1.96	147
Vocations & future career	94	158	16.25*	150	102	9.14*	126	126	0	252
Personal & family welfare	40	58	3.30	40	58	3.30	40	58	3.30	98
Others' welfare	6	16	4.54	14	8	1.63	14	8	1.63	22
Food	30	7	14.29*	17	20	0.24	17	20	0.24	37
Sports & play	6	7	0.07	6	7	1.00	10	3	3.76	13
Miscellaneous	9	16	1.96	14	11	0.36	11	14	0.36	25
To be good	22	67	22.75*	40	49	0.91	51	38	1.89	89
To live long	20	38	5.58	20	38	5.58	18	40	8.34*	58
No death	3	6	1.00	4	5	0.11	7	2	2.77	9
Favorite Activities (Critical χ^2=6.44)										
Home duties & chores	158	117	6.11	116	159	6.72*	135	140	0.09	275
Playing, sports & games	322	317	0.03	329	310	0.56	291	348	5.08	639
Making things	11	12	0.04	13	10	0.39	12	11	0.04	23
Reading & studying	112	154	6.63*	135	131	0.06	147	119	2.94	266
Eating	53	34	4.14	45	42	0.10	55	32	0.10	87
Excursions/exploring	19	23	0.38	24	18	0.85	10	32	11.52*	42
Attending school	6	3	1.00	6	3	1.00	8	1	5.44	9
Social activities	44	35	1.02	29	50	5.58	40	39	0.01	79
Miscellaneous	22	24	0.08	25	21	0.34	26	20	0.78	46
Aversions (Critical χ^2=6.44)										
Aggression/violence/injustice	265	287	0.87	271	281	0.18	278	274	0.28	552
Conflicts/punishment	127	79	11.18*	95	111	1.24	91	115	2.79	206
Dishonesty	146	165	1.16	159	152	0.15	167	144	1.70	311
Disasters	48	55	0.47	56	47	0.46	45	58	1.64	103
Doing chores	14	8	1.63	15	17	2.90	12	10	0.18	22
Poor school performance	7	11	0.88	7	11	0.88	10	8	0.22	18
Miscellaneous	34	38	0.22	21	51	12.50	36	36	0	72
Denial of necessities	15	10	1.00	15	10	1.00	12	13	0.04	25
Conflicts between parents	0	4	4.00	3	1	1.00	3	1	0.25	4
Worries (Critical χ^2=7.22)										
School work	97	117	1.86	92	122	4.20	107	107	0	214
Economic anxiety	33	31	0.06	36	28	1.00	25	39	3.06	64
Loss/accidental damage	40	49	0.91	39	50	1.35	46	43	0.10	89
Punishment	124	112	0.61	109	127	1.37	129	107	2.05	236
Family & social relationships	14	21	1.40	19	16	0.25	15	20	0.74	35
Animals	9	6	0.60	7	8	0.06	7	8	0.06	15
Death & dead people	75	94	2.13	92	77	1.33	75	94	2.13	169
Accidents/disaster	16	7	3.52	10	13	0.39	16	7	3.52	23
Supernatural & strange	156	156	0	17	14	2.88	167	145	1.55	312
Illness/hospital/doctors	54	47	0.48	48	53	0.24	46	55	0.80	101
Dreams	9	6	0.60	9	6	0.60	12	3	5.40	15
Law officers	2	2	0.00	2	2	0	3	1	1.00	4
Darkness	6	1	3.57	3	4	0.14	2	5	1.28	7
Miscellaneous	2	21	15.69	5	18	7.39	20	3	12.56	23
Fears (Critical χ^2=7.22)										
School work	1	0	1.00	0	1	0.5	1	0	1.00	1
Economic anxiety	0	0	0	0	0	0	0	0	0	0
Loss/accidental damage	0	0	0	0	0	0	0	0	0	0
Punishment	3	10	3.84	4	9	1.92	7	6	0.07	13
Family & social relationships	1	2	0.33	1	2	0.33	3	0	3.00	3
Animals	298	197	20.60*	260	235	1.26	241	254	0.34	495
Death & dead people	57	84	5.17	64	77	1.19	67	74	0.34	141
Accidents/disasters	162	135	2.45	145	152	0.16	143	154	0.40	297
Supernatural/strange	195	253	7.50*	224	224	0	227	221	0.08	448
Illness/hospital/doctors	5	7	0.33	8	4	1.33	10	2	5.33	12
Dreams	4	12	4.00	5	11	2.25	9	7	0.25	16
Law officers	3	4	0.12	3	4	0.14	2	5	1.28	7
Darkness	25	24	0.20	24	25	0.02	25	24	0.02	49
Miscellaneous	17	33	5.12	34	16	6.48	27	23	0.32	50

* Significant at $p<.01$ with 1 degree of freedom.

This result may not be unconnected with a recent de-emphasis on handwork as a creative feature of the elementary curriculum, in the part of Nigeria where this study took place. There was a significant difference between rural and urban children in the excursions/exploring category; however, the total number of responses to that category in relation to the overall total is rather small.

Aversions

Most frequently expressed aversions were to aggressive behaviour and injustice, then dishonesty, followed by conflicts with adults. Young children expressed significantly more aversion to conflicts with adults. Making parents unhappy and spanking leading to disturbances in the personal/social relationship base, reported as the major aversions of American elementary school children, are similar to the expressed aversions of the subjects of this study. It is interesting to note that American children are as anxious to maintain good relations with adults as are these Nigerian children. Though a satisfactory child/adult relationship is recognised as an important factor in happy childhood, some cultures have special emphasis areas. In the Nigerian community where this study was done, as in most Nigerian communities, much emphasis is placed on a "good" adult-child relationship, the onus usually being on the child to keep the relationship good by being obedient, maintaining proper respect, and the like. Not infrequently, especially for the older child, providing basic necessities like school materials or even the expression of love is tied up with this maintenance of a good relationship. It would thus appear that in some ways maintaining a cordial relationship with adults would be a more critical issue for the Nigerian than for the North American child. Crippen (1973) however reported aversion to aggression as the issue of greatest concern to the Kenyan children that he studied.

Worries and Fears

In view of the relationship (mentioned in the literature review) between the emotions "fears" and "worries" it is not surprising that there is considerable overlapping and similarity in the categories under which responses were classified in these two indices. However within the Worries index the responses to the various categories were quite close for the variables.

Table 1 reveals the subjects' most common sources of worry to be of the supernatural, of punishment, and of school work, in that order. On the other hand, the subjects' fears were dominated by animals and supernatural beings (such as ghosts and masquerades). Watson (1966), commenting on Jersild's findings about children's fears, noted that the fears of children between the ages of five and twelve tend to be unrealistic. That observation is partly supported by the results of the present study, since fears of some remote animals and ghosts were quite commonly expressed. Older children expressed significantly more fears regarding the supernatural or the strange, while younger children were significantly more frightened of animals.

Educational Implications of the Findings

Of the three variables, age, sex, and physical location, whose effects were observed in this investigation, age showed the greatest influence. Eight of the 14 cases of significant differences as can be seen from Table 1 are due to the effect of age. The importance of age as a developmental factor in the overall growth of children is well documented and the results of this study, by further

demonstrating that importance, suggest that regardless of environment, the age factor is one of the most powerful influences in child development. Eight instances of significant differences dictated by age were found, while two instances were due to sex and four to physical location.

The educational implications of the above are fairly clear. First and foremost they justify and once more reinforce the underlying notion of a developmental approach to child education. This means that the concept of a junior and a senior primary school (or section) is very much in order. Though the concept is accepted in principle for Nigerian school practice, problems resulting from inadequate staff and school equipment frequently produce situations which make actual implementation much less than perfect.

On a continuing basis, however, the designing of primary school curriculum must adhere strictly to the developmental view, so that the classroom teacher realises that in spite of logistic problems, practices and approaches have to be adapted to suit the age of pupils. With regard to wishes, since children, especially those that are younger, value personal possessions so much, the teacher has to realise how tremendously significant little favours can be. The many wishes expressed for school success should alert the teacher to the importance which children attach to success and recognition in school. This is further supported by the high response frequency in the studying/reading category of favourite activities. Opportunities for reading outside the school texts, and other activities likely to inspire or encourage further success should be nurtured at every turn.

The special attention of educators is called to the concerns of pupils. Strong aversion to conflict with adults (including teachers) means that though discipline should be firm, friendly relations with pupils have to be ensured. The excitement and love which animals generate in children is very touching. And yet ironically these still constitute a source of fear for many children all over the world, as the literature and this study reveal. The teacher can build on the basic love of animals by presenting animal life and habits in an exciting form. The rich life of animals can be explored using the integrated approach so that physical form, food, habits, reproduction, uses to man and nature, among other areas can be examined. Frequent trips to zoos, farms, and animal laboratories would add rich excitement to lessons on animals while classroom pets would provide experience in observing what and how animals live from day to day.

One is not surprised by the similarity between the responses of urban and rural children. In spite of the phenomenal rise in Nigeria's urban population in the last ten years, Nigeria is still basically a rural dominated country. Indeed many of the new "urbanites" have one foot in the city and the other in their village such that every weekend or public holiday finds them hurrying back to their villages. The rural-urban lines are not yet as boldly drawn within Nigeria as in the more industrialised countries. However, teachers in rural areas might require to emphasize, in selecting materials like stories and other reading materials and experiences, those that contain technical and applied science concepts in order to make up for their pupils' apparently more limited experiences in this area. A trip to a local factory or even a guided tour of a roadside motor mechanic's workshop would be beneficial and no doubt exciting.

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Relationships Between School-Level and Classroom-Level Environment

In contrast to prior work in which the fields of school-level and classroom-level environment have remained remarkably independent, this study was an investigation of relationships between school and classroom environment variables. Using a sample of 34 secondary school teachers, data were obtained on perceptions of five dimensions of school environment (affiliation, professional interest, achievement orientation, formalization, and innovativeness) and five dimensions of classroom environment (personalization, participation, independence, investigation, and differentiation). Simple, multiple, semipartial multiple, and canonical correlational analyses revealed relationships between school-level and classroom-level environment dimensions, and attested to the potential usefulness of a confluence of school and classroom environment research traditions.

Over the last two decades, workers in several countries have shown increasing interest in the conceptualization, assessment, and study of the environment or climate of whole schools (Deer, 1980) and individual school classrooms (Fraser, 1980). What is noteworthy about the fields of school-level environment is that, despite their simultaneous development and logical linkages, they have remained remarkably independent. Consequently, it is common for workers in one field to have little cognizance of the other field, and for different theoretical and conceptual foundations to be used to underpin research in the two fields. Also it has been rare indeed for either empirical studies or literature reviews to encompass both school and classroom environment.

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This article represents a breakaway from the existing tradition of independence of the two fields of school and classroom environment and contributes in two ways to a confluence of the fields. First, a brief overview is provided of some of the major references, ideas, instruments, and research from each field. Second, a report is given of one of the very few existing studies in which relationships between school-level and classroom-level environmental variables have been investigated.

Prior Research

School Environment Research

School environment research has tended to be closely allied with the field of educational administration and to rest on the assumption that schools can be viewed as formal organizations (Thomas, 1976). Probably the most widely used school-level environment instrument is Halpin and Croft's (1963) Organizational Climate Description Questionnaire (OCDQ), which provides a measure of teachers' perceptions of the behavior of the school principal (aloofness, consideration) and of other teachers (hindrance, intimacy). Also, although the OCDQ was designed initially for use in elementary schools, it has formed the basis for the development of new factor-analytic scales for use in secondary schools in England and Australia (Finlayson & Deer, 1979).

Pace and Stern (1958) developed the College Characteristics Index (CCI) to measure student or staff perceptions of 30 environment characteristics of colleges or universities. Each of these 30 variables (e.g., affiliation, order) was based on Murray's (1938) taxonomy and paralleled a needs scale in the Activities Index (Stern, 1970). That is, each Activities Index scale corresponded to behavioral manifestations of a needs variable, while the parallel CCI scale corresponded to environmental press conditions likely to facilitate or impede their expression. The original CCI has been adapted to form the High School Characteristics Index (HSCI) (Stern, 1961) and the Elementary and Secondary School Index (Richman & Stern, 1979). McDill, Rigsby and Meyers (1969) used scales derived from a factor analysis of items based in part on the CCI and HSCI and established environment-achievement relationships among a large sample of students and teachers.

Some important prior school environment research, including the widely known studies of Coleman (1966) in the United States and Plowden (1967) in Great Britain, has focussed on structural aspects of the school, such as staffing ratios, school size, or number of library books. Both literature and empirical analyses have shown that the key structural dimensions of any bureaucratic organization include dimensions such as formalization and centralization (Hall, 1963; Pugh, Hickson, Hinings, MacDonald, Turner & Lupton, 1963). For example, George and Bishop's (1971) study of school environments involved the four structural dimensions of formalization (extent of school rules and regulations), centralization (extent of teacher participation in decision-making, complexity (degree of specialization), and professional latitude (degree of freedom permitted to teachers), while Kester and Howard (1975) and Corwin (1969) conceptualized the school in terms of its centralization of decision-making, standardization of practices and procedures, supervision of personnel, complexity of organizational structure, and heterogeneity of staff.

Classroom Environment Research

The field of classroom environment research is conveniently synthesized in several recent overviews (Fraser, 1980, 1981a; Fraser & Walberg, 1981; Moos, 1979; Walberg, 1979). These references show that the two instruments used most extensively in classroom environment research are the Learning Environment Inventory (Anderson & Walberg, 1974) and the Classroom Environment Scale (CES) (Moos & Trickett, 1974), although prior studies also have made use of the Class Atmosphere Scale (Silbergeld, Koenig & Manderscheid, 1976), the Individualized Classroom Environment Questionnaire (ICEQ) (Rentoul & Fraser, 1979), and the My Class Inventory (Fisher & Fraser, 1981). These instruments include psychosocial dimensions such as competition, order and organization, involvement, personalization, rule clarity, difficulty, and apathy. Although it is common for school-level environment instruments to involve teachers' perceptions (because students are considered unable to provide accurate information about many aspects of the whole-school environment), most classroom environment instruments are designed to tap students' perceptions. It is interesting to note, however, that the CES and ICEQ have parallel forms for measuring students' and teachers' perceptions of the same classroom. Moreover, the existence of sizable positive associations between teacher perceptions and student class mean perceptions on corresponding scales on the CES (Moos, 1979) and ICEQ (Fraser, 1981a) suggests that teachers' perceptions might be used more often in future research to provide valid and economical measures of classroom environment.

The strongest tradition in prior classroom environment research involves use of the classroom perceptions of students (or sometimes teachers) as predictors of student cognitive and affective outcomes. This research has provided convincing and consistent support for the predictive validity of classroom environment perceptions in accounting for appreciable amounts of variance in student outcomes, beyond that attributable to student characteristics such as intelligence or pretest performance. The pattern emerging from these studies is highlighted in Haertel, Walberg and Haertel's (1981) recent meta-analysis — involving 12 studies of 17 805 students in 823 classes in eight subject areas in four nations — which revealed that learning outcomes were positively associated with certain classroom environment dimensions (e.g., cohesiveness, satisfaction) and negatively associated with others (e.g., friction, disorganization).

When used as dependent variables, perceptions of classroom environment have differentiated revealingly and appreciably between classrooms following alternative curricula (e.g., Levin, 1980) and between classrooms varying in class size (Anderson & Walberg, 1972), grade level (Welch, 1979) and subject matter (Hearn & Moos, 1978). Some classroom environment instruments have been used to measure, not only perceptions of actual environment, but also perceptions of preferred environment. Actual and preferred forms of the ICEQ were used to show some interesting differences in the perceptions of actual and preferred classroom environment among samples of students and teachers (Fraser, in press), and in a person-environment fit study which showed that students achieved better when in their preferred environment (Fraser & Rentoul, 1980). Also, data on actual-preferred discrepancies can be used as a practical basis for planning environmental changes which will align the actual environment more closely with students' or teachers' preferred environment (Fraser, 1981b).

Effects of School Environment on Classroom Environment

Although a detailed critique of prior research is outside the scope of this paper, the independence of the fields of school environment research and classroom environment research needs to be emphasized. This independence meant that the design of the present investigation of associations between school-level and classroom-level environment could not be built on a sound foundation of directly related past research and conceptual analyses. Consequently, as new ground was broken in the present study, its design was derived from the body of indirectly related literature reviewed briefly in this section.

A variety of important literature strongly suggests that factors in the school environment will shape the teachers' behavior and the classroom environment. Social scientists have been concerned for a long time about the problems of socialization of professionals into bureaucracies (Blau & Scott, 1962; Etzioni, 1964), in general, and schools (Moeller & Charters, 1966; Edgar & Warren, 1969; Ortiz, 1978), in particular. Also a number of workers (Kuhlman & Hoy, 1974; Lacefield & Mahan, 1979) have contended that forces operating within the school are likely to mould teachers' role ideology and role performance in directions which align them with the underlying values of the school. For beginning teachers, in particular, Hannam, Smyth and Stephenson (1976) have recognized that major preoccupations are relationships with colleagues and school rules, Willower and Jones (1963), claim that feelings of restriction are felt in the kinds of classroom innovations sanctioned by the school, and Hoy's (1968) study indicates that the process of socialization influenced control ideology making it become more custodial during the first year of teaching.

It was considered important in the present investigation to be able to provide a conservative test of relationships between school-level and classroom-level environment variables by controlling statistically key variables which were codeterminants of classroom environment. A review of empirical evidence suggested that two of the most important determinants of classroom environment are the nature of the curriculum and students' classroom environment preferences. Several prior studies have firmly established that classroom environment perceptions differ markedly between groups of classes following alternative curricula (Anderson, Walberg & Welch, 1969; Cort, 1979; Fraser, 1979; Levin, 1980). Students' classroom environment preferences were chosen as predictors of actual classroom environment after consideration of Haller's (1967) view that students shape teacher behavior through the mechanism of operant conditioning, of Turner's (1967) model linking student characteristics to teachers' behaviors, and of Lieberman and Miller's (1978) claim that students' attitudes and preferences play an important role in the process of teacher socialization.

Measurement of School-Level Environment

In the present investigation of relationships between school and classroom environment, school-level environment was measured with the following five scales selected from the *School-Level Environment Questionnaire (SLEQ)*: Affiliation, Professional Interest, Achievement Orientation, Formalization, and Innovativeness. The development of the SLEQ, which has been described in detail elsewhere (Rentoul & Fraser, in press), was guided by the following five criteria:

1. *Consistency with literature.* The dimensions included in the SLEQ were selected to characterize important dimensions of the school environment described

in the literature and in other school environment instruments (e.g., Halpin & Croft, 1963; Stern, 1970; George & Bishop, 1971). In fact, the characteristics identified include the nature of personal relationships among teachers and between teachers and students, opportunities for personal and professional development, the organizational structure (e.g., leadership, decision-making, support, propensity for change), and the goal orientation and social structure of the school.

2. *Coverage of Moos' general categories.* Moos (1974a) has found that the same three general categories can be used in conceptualizing the individual dimensions characterizing diverse psychosocial environments (e.g., university residences, work milieus). These three basic types are *Relationship Dimensions*, which identify the nature and intensity of personal relationships, *Personal Development Dimensions*, which assess the basic directions along which personal growth and self-enhancement tend to occur, and *System Maintenance and System Change Dimensions*, which involve the extent to which the environment is orderly, clear in expectations, maintains control, and is responsive to change. Since Moos claims that, at minimum, Relationship Dimensions, Personal Development Dimensions, and System Maintenance and System Change Dimensions must all be assessed to provide an adequate and reasonably complete picture of any environment, dimensions for the SLEQ were chosen to provide coverage of each of Moos' three general categories.

3. *Salience to practising teachers.* While the two previous criteria ensure that an instrument's dimensions are consistent with theoretical consideration, they do not "give reasonable assurance that the vocabulary and finite provinces which will be embodied in the instrument are salient for the majority of respondents" (Young, 1980, p. 59). Although many existing instruments were developed without checking their salience to teachers, extensive interviewing with practising primary and secondary teachers ensured that the SLEQ's dimensions and individual items covered aspects of the school environment perceived to be salient by teachers.

4. *Specific relevance to schools.* As some existing school environment instruments are adaptations of scales designed originally for other non-school environments, their relevance to the school situation cannot be assumed. For example, Moos' (1974b) Work Environment Scale, which is purported to be suitable for any work environment, contains some items which lack relevance specifically to the school environment. Consequently, in developing the SLEQ, only material which was specifically relevant to schools was included.

5. *Economy.* Several existing classroom environment instruments lack economy in terms of teachers' answering time, researchers' processing time, or both. For example, it would take the teacher a relatively long time to complete the 30 scales contained in the College Characteristics Index (Stern, 1970), and Finlayson and Deer's (1979) instrument is complex in that some scales are answered by teachers while others are answered by groups of students. In developing the SLEQ, an attempt was made to achieve economy by developing an instrument with a relatively small number of reliable scales, each containing a fairly small number of items.

An initial pool of items was written for each scale and this was modified subsequently after receiving reactions solicited from groups of educational researchers and practising teachers. The final step involved refining scales to form a final version after the application of standard item analysis techniques to data

collected from a previous administration of the SLEQ to the sample of 83 teachers described in Rentoul and Fraser (in press). Each SLEQ scale contains seven items and each item is scored on a five-point scale with the responses of Strongly Agree, Agree, Not Sure, Disagree, and Strongly Disagree. Table 1 serves to clarify further the nature of the SLEQ by providing a scale description and sample item for each scale and showing each scale's classification according to Moos' scheme.

TABLE 1

DESCRIPTIVE INFORMATION, INTERNAL CONSISTENCY (ALPHA RELIABILITY), AND DISCRIMINANT VALIDITY (MEAN CORRELATION WITH OTHER SCALES) FOR EACH SLEQ SCALE

Scale Name	Description of Scale	Sample Item	Alpha Reliability	Mean Correl. with Other Scales
Affiliation (R)	The teachers can obtain assistance, advice, and encouragement and are made to feel accepted by colleagues.	I feel that I could rely on my colleagues for assistance if I should need it. (+)	0.85	0.18
Professional Interest (P)	Teachers discuss professional matters, show interest in their work, and seek further professional development.	Teachers show little interest in what is happening in other schools. (-)	0.81	0.29
Achievement Orientation (P)	Teachers value and expect high student achievement, and competition among students is encouraged.	Students at this school are seldom under pressure to excel at academic work (-)	0.91	0.23
Formalisation (S)	Teachers are expected to comply with set rules, guidelines, and procedures and are supervised to ensure rule compliance.	I am often supervised to ensure that I follow directions correctly. (+)	0.68	0.05
Innovativeness (S)	The school is in favor of planned change and experimentation, and fosters classroom openness and individualization.	Teachers are encouraged to be innovative in this school. (+)	0.78	0.22

R: Relationship Dimensions;
P: Personal Development Dimensions;
S: System Maintenance and System Change Dimensions

Items designated (+) are scored by allocating 5,4,3,2,1, respectively, for the responses Strongly Agree, Agree, Not Sure, Disagree, Strongly Disagree.
Items designated (-) are scored in the reverse manner.
Omitted or invalid responses are given a score of 3.

Rentoul and Fraser (in press) have reported validation data for the SLEQ based on a previous validation sample of 83 teachers. Table 1 provides cross-validation information about each scale's internal consistency (Cronbach alpha reliability coefficient) and discriminant validity (mean correlation of a scale with the other four scales) based on the present study's sample consisting of 34 secondary school teachers, each in a different government high school in New South Wales, Australia. Approximately equal numbers of science and social science teachers, male and female teachers, and metropolitan and country schools made up the sample for the present investigation. Also each teacher was a beginning teacher in his or her first year of teaching after preservice education. Table 1 shows that the alpha coefficient for different SLEQ scales ranged from 0.68 to 0.91. These values suggest that each SLEQ scale displayed satisfactory internal consistency for a scale composed of only seven items. The values of the mean correlation of a scale with the other scales in Table 1 range from 0.05 to

0.29. These indicate satisfactory discriminant validity and suggest that the SLEQ measures distinct although somewhat overlapping aspects of school environment.

Measurement of Classroom-Level Environment

Classroom-level environment was measured in the present study with the five scales contained in the *Individualized Classroom Environment Questionnaire (ICEQ)*. Features of the ICEQ that distinguish it from other classroom environment instruments are that it can be responded to by either teachers or students, and that it measures dimensions which are especially salient in individualized classrooms following open or inquiry-based approaches. The names of the five scales in the ICEQ are Personalization, Participation, Independence, Investigation, and Differentiation.

The development and validation strategies employed with the ICEQ are described in detail elsewhere (Rentoul & Fraser, 1979; Fraser, 1981a, c, d). The four main steps in the ICEQ's development, which are similar to those followed in developing the SLEQ, are discussed below:

1. *Consistency with literature.* Dimensions chosen characterized the classroom learning environment described in the literature of individualized education, including open and inquiry-based classrooms (e.g., Rathbone, 1971; Weisgerber, 1971; Walberg and Thomas, 1972).

2. *Coverage of Moos' general categories.* Dimensions chosen provided coverage of the three general categories of dimensions — Relationship Dimensions, Personal Development Dimensions, and System Maintenance and System Change Dimensions — delineated by Moos (1974a) for conceptualizing all human environments.

3. *Salience to teachers and students.* Extensive interviewing with teachers and secondary school students was conducted in order to ensure that the ICEQ's dimensions and individual items were considered salient by teachers and students.

4. *Economy.* In order to achieve economy in answering and processing, the ICEQ was designed to have a relatively small number of reliable scales, each containing a fairly small number of items.

A most important step in the development of the ICEQ involved modifying an initial pool of items after receiving reactions solicited from groups of educational researchers, practising school teachers, and school students. The last step in the ICEQ's development consisted of further refining the scales to form a final version by application of standard item analysis techniques to data collected from a number of different samples described in Rentoul and Fraser (1979). The final version of the ICEQ consists of 50 items, with each of the five dimensions being assessed by 10 items. Each item is scored on a five-point scale with responses of Almost Never, Seldom, Sometimes, Often, and Very Often. The scoring direction is reversed for approximately half of the items.

Table 2 helps to clarify the nature of the ICEQ by showing the classification of each scale according to Moos' scheme and by providing a scale description and sample item for each scale. This table also shows information about the internal consistency reliability and discriminant validity of the ICEQ's scales for the sample of 34 teachers involved in the present research. This table shows that, for different ICEQ scales, the alpha coefficient ranged from 0.75 to 0.89 and the mean correlation of a scale with the other scales ranged from 0.25 to 0.36. These values,

which are similar to those reported for other samples (Fraser, 1981a) suggest that each ICEQ scale has adequate internal consistency and discriminant validity.

TABLE 2

DESCRIPTIVE INFORMATION, INTERNAL CONSISTENCY (ALPHA RELIABILITY), AND DISCRIMINANT VALIDITY (MEAN CORRELATION WITH OTHER SCALES) FOR EACH ICEQ SCALE

Scale Name	Description of Scale	Sample Item	Alpha Reliability	Mean Correl. with Other Scales
Personalization (R)	Emphasis on opportunities for individual students to interact with the teacher and on concern for the personal welfare and social growth of the individual.	The teacher considers students' feelings (+)	0.88	0.26
Participation (R)	Extent to which students are encouraged to participate rather than be passive listeners.	The teacher lectures without students asking or answering questions. (-)	0.82	0.36
Independence (P)	Extent to which students are allowed to make decisions and have control over their own learning and behavior.	Students choose their partners for group work. (+)	0.86	0.26
Investigation (P)	Emphasis on the skills and processes of inquiry and their use in problem-solving and investigation.	Students find out the answers to questions and problems from the teacher rather than from investigations. (-)	0.89	0.34
Differentiation (S)	Emphasis on the selective treatment of students on the basis of ability, learning style, interests, and rate of working.	Different students use different books, equipment, and materials. (+)	0.75	0.25

R: Relationship Dimensions
P: Personal Development Dimensions
S: System Maintenance and System Change Dimensions.

Items designated (+) are scored 1,2,3,4,5, respectively, for the responses Almost Never, Seldom, Sometimes, Often, Very Often.
Items designated (-) are scored in the reverse manner.
Omitted or invalid responses are given a score of 3.

Design of Study

The study involved the sample of 34 beginning teachers in responding to both the SLEQ and the ICEQ. This provided a measure of perceived school-level environment in 34 different schools, and a measure of the classroom-level environment in one class taught by each of the 34 teachers. The use of teachers' perceptions in this research to assess environment has the major advantage that teachers' perceptions are the immediate influence on behavior and role performance (Power, in press).

As noted previously the variables of curriculum and students' classroom environment preferences were included in some analyses as codeterminants to permit a more conservative test of the effects of school-level environment on classroom-level environment. The curriculum variable used was a dichotomous curriculum materials variable which designated whether individualized or conventional curriculum materials had been in use in each classroom involved in the study in the months prior to data collection. In order to permit inclusion of student classroom environment preferences in some analyses, measures were taken of student preferences for classroom individualization in each class whose

environment had been rated by a teacher in the sample. In fact, the preferred form of the ICEQ was administered in each classroom, and class means were calculated to represent student preferences for the same five dimensions (Personalization, Participation, Independence, Investigation, and Differentiation) for which teachers had provided ratings of actual classroom environment.

Analyses and Results

Relationships between school-level and classroom-level environment were explored in the present study using the five methods of data analysis shown in Table 3 and used in a previous study (Fraser, 1981d). The first and most simple analysis in Table 3 is a simple correlational analysis involving the five classroom-level environment scales and the five school-level environment scales. Results indicate that eight of the 25 correlations were significantly different from zero ($p<.05$), which is about six times that expected by chance. It is noteworthy also that all significant correlations were positive except those for the Formalization scale. In particular, findings suggest that increased levels of school Formalization were associated with lower levels of classroom Participation, Independence, and Differentiation.

TABLE 3

SIMPLE, MULTIPLE, SEMIPARTIAL MULTIPLE, AND CANONICAL CORRELATIONS (USING RAW AND RESIDUAL CLASSROOM ENVIRONMENT SCORES) BETWEEN FIVE SCHOOL-LEVEL AND FIVE CLASSROOM-LEVEL ENVIRONMENT SCALES

Classroom Environment Scale	Simple Correlation, r					Multiple Correlation	Semipartial Multiple Correlation[a]
	Affil (R)	Prof Int (P)	Ach Or (P)	Form (S)	Innov (S)	R	sR
Personalization (R)	0.35*	0.16	-0.03	-0.22	0.34*	0.57*	0.52*
Participation (R)	0.10	0.10	0.38*	-0.36*	0.03	0.58*	0.31
Independence (P)	0.07	0.10	0.05	-0.37*	-0.12	0.38	0.43
Investigation (P)	0.19	0.35*	0.52**	0.13	0.10	0.66**	0.48*
Differentiation (S)	-0.15	0.08	-0.05	-0.35*	0.10	0.36	0.31
					Canonical Correlation:	Rc = 0.77** (Raw class env. scores)	Rc = 0.60* (Residual class env. scores[a])

* $p<.05$
** $p<.01$

[a] Involves adjustment for a curriculum variable and student preferences on corresponding classroom environment scale.

R: Relationship Dimensions
P: Personal Development Dimensions
S: System Maintenance and System Change Dimensions.

While a simple correlational analysis can provide useful information, the multiple correlation of the set of school environment variables with each classroom environment scale provides a more parsimonious picture of the joint influence of correlated predictors, and reduces the Type 1 error rate associated with the simple correlational analysis. Table 3 shows that the magnitude of the multiple correlation between a classroom environment variable and the set of five school environment scales was 0.57 for Personalization, 0.58 for Participation, 0.38 for

Independence, 0.66 for Investigation, and 0.36 for Differentiation. These values were significantly greater than zero ($p < .05$) for three classroom environment scales, namely, Personalization, Participation, and Investigation. Furthermore, by squaring the values of the multiple correlation, it can be seen that the amount of variance in different classroom environment scales explained by the set of school environment dimensions was 32, 34, 15, 44, and 13 per cent, respectively, for the Personalization, Participation, Independence, Investigation, and Differentiation scales.

In order to provide a more conservative test of the relationship between classroom-level and school-level environment variables, the two background characteristics discussed previously were controlled statistically in some analyses. These were the curriculum variable (individualized vs. conventional materials) and the class mean of students' preferred environment scores for the corresponding scale of the ICEQ. The last column of figures in Table 3 shows the value of the semipartial multiple correlation between each actual classroom environment scale and the set of five school environment scales, when the effects of both the curriculum variable and students' preferences for the corresponding classroom environment dimension were controlled. Although the values of the semipartial multiple correlation (0.52, 0.31, 0.43, 0.48, and 0.31 for the five classroom environment scales) are smaller than the values of the multiple correlation, they were still found to be significantly greater than zero ($p<.05$) for the Personalization and Investigation scales. Moreover, since the square of the semipartial multiple correlation represents the increment in explained variance, it can be seen that the set of SLEQ scales accounted for an increment of between approximately 10 and 27 per cent of the variance in different classroom environment variables (over and above that attributable to the curriculum variable and student preferences for the corresponding classroom environment variable).

Although use of multiple correlations and semipartial multiple correlations overcomes the problem of collinearity between school environment scales, intercorrelations amongst classroom environment scales could still give rise to an inflated experimentwise Type I error rate. Canonical analysis, however, can provide a parsimonious picture of relationships between a domain of correlated classroom environment variables and a domain of correlated school environment variables. Consequently, two canonical analyses were conducted. The first was analogous to the multiple correlational analysis in that it explored relationships between scores on the set of five school environment scales and raw scores on the set of five classroom environment scales. The second canonical analyses was analogous to the semi-partial multiple correlational analysis in that it explored relationships between scores on the set of five school environment scales and residual scores on the set of classroom environment scales (i.e., scores adjusted for the curriculum variable and the corresponding student preferred classroom environment score). The bottom of Table 3 shows that each canonical analysis yielded one significant canonical relationship. A significant canonical correlation of 0.77 ($p<.01$) was found between school environment scales and raw scores on the classroom environment scales, while a significant canonical correlation of 0.60 ($p<.05$) was found between school environment scales and residual scores on the classroom environment scales.

Although the five separate analyses reported in Table 3 are consistent in that each supports the existence of relationships between school-level and classroom-level environment dimensions, each analysis leads to a somewhat

different interpretation of relationships between individual school environment and classroom environment dimensions. The interpretation of significant simple correlations can be obtained readily by examining the signs in Table 3. In particular, it can be seen that greater Formalization in the school environment was associated with lower levels of classroom Participation, Independence, and Differentiation. Also it is noteworthy that, of the eight statistically significant simple correlations, there were four cases in which a school environment scale classifiable as a particular general category in Moos' scheme was significantly related to a classroom environment scale classifiable in the same general category. The most sophisticated analysis reported in Table 3 (i.e., the canonical analysis of residual classroom environment scores) revealed a more concise interpretation. An examination of canonical loadings suggested that, with the curriculum variable and student preferences on the corresponding classroom environment scale controlled, greater Formalization and Achievement Orientation in the school environment was linked with greater classroom Investigation and less classroom Independence.

Conclusion

By describing a study of relationships between school-level environment and classroom-level environment, this article differs from most prior work in which the fields of school and classroom environment have been largely independent. The two new measuring instruments used in the research were the School-Level Environment Questionnaire (SLEQ), which measures teacher perceptions of school Affiliation, Professional Interest, Achievement Orientation, Formalization, and Innovativeness, and the Individualized Classroom Environment Questionnaire (ICEQ), which measures teacher perceptions of classroom Personalization, Participation, Independence, Investigation, and Differentiation. Relationships between these five school-level and five classroom-level environment variables were explored for a sample of secondary school teachers using five different methods of data analysis. These were a simple correlational analysis, a multiple correlational analysis involving the prediction of each classroom environment dimension from the set of school environment scales, a semipartial multiple correlational analysis involving prediction of each classroom environment dimension from the set of SLEQ scales but with control for some background variables, a canonical analysis involving raw scores on the classroom and school environment variables, and a canonical analysis involving raw scores on the school environment scales and residual classroom environment dimensions adjusted for background variables.

As the present study involved a relatively small sample of beginning teachers, caution is needed in placing too much weight on its findings until replications have been carried out with a variety of larger samples. Nevertheless, taken together, results from the present study's five separate analyses provide some initial consistent support for the existence of sizable and statistically significant relationships between school-level and classroom-level environment variables. For example, it was found that greater Formalization in the school environment tended to be associated with lower levels of classroom individualization, especially on the Participation, Independence, and Differentiation scales. Finally, with respect to future research, this study attests to the validity and usefulness of the SLEQ and ICEQ and to the desirability of a confluence of school-level and classroom-level environment research traditions.

Note

1. A copy of the SLEQ or the ICEQ together with scoring instructions may be requested from Barry J. Fraser, Faculty of Education, Western Australian Institute of Technology, South Bentley, W.A., 6102, Australia.

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Opinions of Alberta Students Towards Work

The purpose of the study was to develop an instrument that would measure high school students' opinions toward the world of work. From a literature review, and from ideas and opinions of experienced counsellors, a pool of items was created and tried on a sample of 360 Alberta students. From the preliminary study, 75 items were selected for the final instrument. The items were grouped into 15 scales. The instrument was administered to 1035 students in eight locations in Alberta. Item results indicated that the students' opinions were generally supportive of the traditional prairie work ethic. Scale score data indicated that the opinions were stable over one month, that the scales were reasonably homogeneous, and that they were relatively independent of each other. Scale differences between sexes, between two grade levels and between students who had previous work experience and those who did not were examined. The results tended to be consistent with results presented in the work value literature.

The general area of work-values, work-attitudes, and job preferences, is a broad continuum, extending from enduring values to more transient opinions. At the values end, researchers such as Super (1968), Holland (1973), and Lofquist and Dawis (1978), have focussed their efforts on describing the fundamental personality characteristics that relate to job selection and job satisfaction.

Moving from the values end of the continuum, one passes through the area of Pryor's (1979) work aspect preferences which are statements of relationships between a person and particular qualities of work, and are viewed as being

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TABLE 1

COMPARISON OF SUBSCALES MEASURED ON SOME PREVIOUS WORK VALUE INSTRUMENTS

Instruments Author, Date, Name of Scale	Extrinsic 1. Salary 2. Security 3. Prestige 4. Working Conditions 5. Fringe Benefits					People-Oriented 6. Working with People 7. Leadership 8. Helping People 9. Supervisory Relations				Intrinsic 10. Independence 11. Achievement 12. Self-Development 13. Training 14. Ideas 15. Interesting Work 16. Creativity 17. General Philosophy							
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
Rosenberg, 1957 Occupational Values Scale	X	X	X			X	X	X		X		X				X	X
Dipboye et al., 1959	X	X	X	X	X	X				X	X				X		
Eyde, 1962 Work Value Scale	X		X			X	X			X	X				X		
Kilpatrick et al, 1964 Occupational Value Scales	X		X			X	X	X		X	X						X
Thompson, 1966 Occupational Value Scale	X	X	X			X	X	X	X	X				X	X		
Hall, 1968 Occup. Orientation Inventory	X	X	X	X		X		X		X	X	X					X
Super, 1968 Work Values Inventory	X	X	X	X		X	X	X	X	X	X	X		X	X	X	X
Wollock, 1971 Survey of Work Values	X		X				X				X	X					X
Hales & Fenner, 1972 Ohio Work Values Inventory	X	X	X	X			X	X		X	X	X		X		X	
Perrone, 1973 Occup. Values Inventory	X	X				X		X		X		X				X	X
Schab, 1974 Work Ethic Survey	X			X		X				X	X						X
Burton, 1975	X	X	X	X	X	X	X			X	X	X	X				X
Kazanas, 1975 Meaning & Value of Work Scale	X	X	X	X		X		X	X	X	X	X			X		
Jackson, 1977 Jackson Vocational Survey		X	X			X	X			X	X	X		X			
Mietus, 1977 Maryland Work Value Inventory	X		X					X			X	X	X				X

List of Comparable Terms for Subscales

Subscale	Associated Terminology
01. Salary	Income, good money, monetary concern, economic, economic return, earnings, pay considerations.
02. Job Security	N/A
03. Prestige	Status, esteem, company reputation, dominance-recognition, accountability.
04. Working Conditions	Location, surroundings, solitude.
05. Fringe Benefits	N/A
06. Working with People	Relations with others, social, affiliation, recognition, belongingness, co-worker concern, associates, social status, interpersonal confidence, sex discrimination, influence.
07. Leadership	Dominance-recognition, management, responsibility, control, power.
08. Helping People	Helpful, altruism, affiliation, people orientation, altruism toward society.
09. Supervisory Relations	Being boss, interpersonal relations.
10. Independence	Freedom, free from supervision.
11. Achievement	Advancement, personal or task satisfaction, pride, success, aspiration, upward striving.
12. Self-Development	Special abilities, self-realization, planfulness, altruism toward self, involvement, self-actualization, esthetics, fulfillment, using capabilities.
13. Training	Skill development.
14. Ideas	Stamina, intellectual stimulation, express ideas.
15. Interesting Work	Interesting activity, variety.
16. Creativity	N/A
17. General Philosophy	Adventure, risk, way of life, type of work, work as avoidance, time for family.

significant to vocational counselling. Beyond work aspect preferences, an area is encountered in which preferences begin to blend into opinions. These opinions are not necessarily strongly held, nor even particularly enduring; they may change from one month to the next as a result of experience or personal growth, or over time they may evolve into more deeply entrenched beliefs. It is to this rather unstable area of attitudes and perceptions that the present paper is directed.

Little work seems to have been done directly on high school and junior high school students' attitudes, perceptions and anticipations about the world of work, in spite of the number of occupational preference scales, and work values inventories that exist. Specifically, little has been done on their general perceptions about employers, and on their perceptions about the adequacy of preparation that they receive. The primary purpose of the present study was to develop an instrument that would fill this gap. A second purpose was to use the instrument to describe perceptions found among Alberta high school students. It was hoped that by providing a method of collecting perceptions and opinions from young people, future research could begin to trace the development of work values.

Literature Review

In attempting to develop an instrument, the authors were mindful of the relationships that likely exist among values, preferences, and opinions. The initial stage involved a search for previously used scales in these areas.

Fifteen work value instruments, formulated between 1957 and 1977, were reviewed. The author, year, title, and subscales for the respective instruments can be seen in Table 1. The most common subscales have been arranged in one of three major categories: Extrinsic, People-Oriented, and Intrinsic. Since the various instruments used different labels for similar constructs, a "Comparable Term" chart is provided so that the reader can see what has been clustered into common groups.

It was noted that most of the instruments were directed to the measurement of work values. The scales seemed to be based on past experience rather than toward future expectations, and, most importantly, the developers appeared to assume that respondents had already formulated a work value system. Nevertheless, in most cases, the concepts underlying existing scales could be applied to eliciting future-oriented expectations and opinions from students with little previous work experience.

Many of the instruments shown in Table 1 have been used in studies of student work values. In some cases group differences have been shown. Two of the major independent variables have been age and sex. Findings for these have been summarized in Table 2.

Recent studies have dealt with age as a factor by comparing either grade levels (Dipboye & Anderson 1959; Hales & Fenner, 1972; Perrone, 1973; and Wijting, 1977) or generation levels (Wijting, 1978; Mietus, 1978). In general, grade level differences seemed to indicate that junior high school students exhibited a more extrinsic pattern of attitudes (e.g., pay, security) while senior students (Grade 10 through 12) were more intrinsically-oriented (e.g., interesting work, altruism). In terms of generational differences, senior high school students were found to have a work value system similar to that of their parents.

TABLE 2

GROUP DIFFERENCES ON WORK ATTITUDES

Author	Date	Sample Size	Grade Level	Significant Differences
a. Grade Level as an Age Factor				
Dipboye	1959	1181	9, 12	Interesting Work, Advancement
Hales	1972	116	5, 8, 11	Altruism, Self-realization
Perrone	1973	170	7 to 12	Security, Independence, Using Capabilities, Fulfillment, Income, Helping Others, Working with People, Time for Family.
Wijting	1977	1402	6, 9, 10, 12	Pay, Status, Power, Security, Activity, Involvement, Pride
b. Generation as an Age Factor				
Mietus	1978	1476	10 to 12	Skill development, Economic, Status, Personal Satisfaction, Altruism toward Society
Wijting	1978	342	6, 9, 10, 12	Social Status, Activity, Job Involvement, Upward Striving, Earnings, Pride
c. Sex Factor				
Dipboye	1959	1181	9, 12	Salary, Advancement, Independence, Prestige, Interesting Work, Working Conditions, Relations with Others
Thompson	1966	1788	10	Leadership, Being boss, Pay, Recognition, Expressing Ideas, Helping People
Perrone	1973	170	7 to 12	Security, Using Capabilities, Income, Independence, Fulfillment, Helping Others, Working with People, Time for Family
Schab	1974	709	10, 11, 12	Independence
Smithers	1975	757	12	Security, Economic, Status, Leadership, Free from Supervision, Working with People, Being Helpful
Gade	1977	79	10, 11, 12	Economic Return, Independence, Security, Altruism
Wijting	1977	1402	6, 9, 10, 12	Economic, Status, Activity, Involvement, Pride
Schab	1978	302	12	Independence, Freedom, Working Conditions
Mietus	1978	1400	10, 11, 12	Economics, Status, Personal Satisfaction, Skill Development, Altruism Social
Sayer	1980	93	9	Traditional Aspirations

Ten studies published between 1959 and 1980 examined sex differences among secondary school students. In general, males exhibited more extrinsic work values (e.g., salary, security, status) than females. Intrinsic concerns for males tended to be independence and leadership. Females were basically intrinsically-oriented (e.g.,

interesting work, altruism, personal satisfaction). Their most common extrinsic concern was working conditions.

Instrument Development

Recalling Pryor's (1979) caution that characteristics of work can be classified in a number of ways, the authors tried to seek out opinions that fell along various dimensions. For example, the desired viewpoints ranged from extrinsic concerns (e.g., salary, job security, working conditions) to such people-oriented and intrinsic matters as confidence of success, unemployment, and expectations of employers. Using the literature review, and using the opinions of colleagues and friends, a large pool of statements pertaining to the world of work was created. From the pool of statements, two preliminary forms of an instrument were created using a Likert format (Strongly Agree, Agree, Undecided, Disagree, Strongly Disagree). Each form, consisting of 125 items, was administered to 360 different students in grades 8 and 11 from two rural and two urban locations in Alberta.

A careful study of the results was made to identify items which were ambiguous, poorly worded, or beyond the comprehension of the students. Further analyses were carried out to see if the items could be clustered into scales. Based on these analyses, it was decided to use 75 items grouped into 15 scales of 5 items each.

The instrument was administered to 467 ninth grade students and 568 twelfth grade students in eight locations in Alberta (Edmonton, Wetaskiwin, Lacombe, Red Deer, Medicine Hat, Lethbridge, Andrew, and Jasper). Although the sample was not a random sample of Alberta students, it did contain a representative mixture of rural and urban students, as well as geographical representation of the central and southern portions of the province. Fifty-three percent of the sample was female, and 47% was male.

Results and Discussion

In the Appendix, the item results are given in percentages of people responding to each of the Likert categories. The items have been grouped according to scale membership, and for each scale, a general description is given, as well as the median scale score. Scale scores were calculated by assigning values of 1 (Strongly Disagree) to 5 (Strongly Agree). (In the case of item 1.3, the scoring was reversed.) In addition, the interval in which 90% of the students fell is shown for each scale.

A separate sample of students was used to calculate test-retest reliabilities. The intervening time interval was about one and one-half months, and 196 students responded to both administrations. These correlations are also shown in Appendix 1.

The results are presented in two sections. In the first section the responses to items in each of the fifteen clusters are presented and discussed in turn. In the second section the results of the scale score analyses are presented and discussed.

Item Responses

The *school preparation* items generally receive a favorable endorsement from the students, although there is not strong support for the notion that schools do a good job of teaching you how to look for a job (1.4). This may reflect a tendency

on the part of high school counsellors to overlook the practical problems of getting a job, in preference to dealing with more general life skill issues.

On the items forming the *interest and variability* cluster, the students supported the view that stimulating jobs were better than boring jobs. However this was tempered in item 2.4 in which uncertainty was expressed as to whether they would quit a boring job.

A bit surprising to the investigators was the strong endorsement of most of the *diligence* items (scale 3). It might be suspected that the students gave us what they thought that we wanted to hear. However, many students took the opportunity to write comments in the space provided (31% of the junior high school students and 33% of the high school students made comments), and the comments supported the item data. The results of the *laziness* items were consistent with the *diligence* items.

There was a fairly high endorsement of *job security* statements, although in item 5.4, the students indicated that perhaps stimulation was more important than security. Also interesting was the response to the statement on liking a job in which it would be difficult to be fired (5.4). Perhaps the substantial minority that disagreed with this, did so on the assumption that such jobs are less interesting. On the other hand it may be consistent with the diligence items in which work and rewards are related.

Although few students had extensive experience with employers, their responses to the various *positive employer* items indicated an opinion that employers would be fair. The item that showed some tendency away from this involved dress and appearance rules that might be enforced by some employers. It is possible that students had encountered some of these rules through their friends and through part-time work in sales positions.

As expected, there was a fairly strong endorsement of *independence* within the job. The responses suggested that 10 to 15% did not view independence as being as important as other students did. In particular, items 7.1 and 7.3 suggest that these students may have realistically assessed the opportunities for freedom within many job situations.

Although *money* was clearly important, both the item responses (8.4 in particular), and the comments indicated that it was not the most important consideration to most students. Similarily, *ambition* was important, but was subordinate to friendship (9.1).

The *locus of control* items showed a healthy degree of internal control. In some items, this might be a reflection of the general positive economic climate in the province. (In response to the item suggesting that association or union membership is important (10.5), the tendency to disagree may represent the predominant political-social ideology of the province.)

The *confidence* items reflect the general trends noted elsewhere. However, item 11.4 does indicate that counsellors may not be providing vocational information to students to the degree that might be helpful to them as they proceed with career selection.

The *negative employer characteristics* items were characterized by some large undecided responses (about 30-40%). This is not surprising given the age of the students. Those students who did have an opinion tended to reject negative views of employers.

In view of the very social nature of most students' lives, it was not unanticipated to find that they subscribed to the *social characteristics* of work.

The economic climate in Alberta produces a very low unemployment rate, and for many of the students, *unemployment* is not something with which they have much direct experience. In spite of this, their responses to the various items on the unemployment scale suggest a balanced view. Work is important, yet for many students there are conditions in which gaining employment is difficult. Comments by some students indicated that they referred the statements to their own personal experiences. "I have been looking for a job for months; no luck yet but you still must try" was a comment received from a senior high school student.

In *general*, the students seemed to possess positive, optimistic opinions about the world of work and their future in it. Item 15.4 supports this contention, as do others throughout the instrument.

Scale Score Results — General

Although the scales were not meant to represent enduring psychological traits, the scores can be taken as compilations of opinions relative to broad, work related areas. It was intended that the scales be relatively independent, and that the opinions expressed through the scale scores be reasonably consistent over time. The latter assertion was tested over a month and the resulting reliabilities fell between .5 and .7 except for Diligence which was .46.

Correlations were calculated between pairs of scale, and the strongest relationship was found to be between Diligence and Laziness (-.46). The direction of the relationship was anticipated, but it was interesting that even though the names suggest polar opposites, the magnitude of the correlation is far from -1. This may arise from an oversimplification of labels, or it may be due in part to the relatively high homogeneity of responses on the Laziness scale.

The next largest correlations were in the neighbourhood of .35, and described the relationship between Interest and three other scales: Diligence, Independence and Social Relations. Diligence also correlated with Social Relations and the General scale at about the same level (.31 and .32). Laziness and External Locus of Control had an interesting correlation of .3, perhaps suggesting that people who find success as being beyond their control do not seem to be as critical of laziness as other people. Only three other correlations exceeded .3. They were Money and Unemployment, Confidence and General, and Social Relations and General.

Of the 105 correlations, only ten were greater than .3 and none was greater than .5, an indication that the scales are relatively independent in spite of the similarity of some of their content.

Scale Results — Group Differences

In collecting the responses to the instrument, students were asked several background questions. Three of the questions seemed of sufficient interest to warrant a comparison of scale scores between different groups of students. It had been suggested in the review of the literature that differences existed between work attitudes of younger and older students, so it was decided to compare the opinions of the junior high school students and the senior high school students to see if similar differences existed in the Alberta sample. Sex differences were examined for the same reason. The third question had to do with previous

experience with a full time summer job. It was felt that the students' opinions might be dependent upon past experience, and so scale scores were compared between students who had held a full time job in the previous summer, and those who had not. The means of scales on which significance was found are shown in Table 3.

TABLE 3

MEANS FOR SCALES SHOWING SIGNIFICANT DIFFERENCES

Scale	Level		Sex		Full Time Job	
	JH	SH	F	M	Yes	No
1. Preparation	18.5	17.5			17.8	18.2
2. Interest	19.8	20.2	20.2	19.8	19.9	20.2
3. Diligence						
4. Laziness			9.1	10.3		
5. Job Security			17.6	18.1		
6. Positive Employer Characteristics	18.1	17.7			18.0	17.7
7. Independence	17.4	18.3	17.5	18.3		
8. Money	16.6	16.1	15.8	17.2	16.6	16.2
9. Ambition			16.9	17.4		
10. Locus of Control	12.9	13.4	12.9	13.5		
11. Confidence	17.3	17.8	17.3	17.9	18.0	17.5
12. Negative Employer Characteristics			14.4	15.0	14.4	14.9
13. Social			20.1	19.2		
14. Unemployment			15.7	17.2	16.5	16.1
15. General			18.3	17.6		

High School — Junior High School Differences

There were seven scales upon which significant differences were found between junior high school (JH) students and senior high (SH) school students. On three of these the JH group scored higher. They rated their preparation as being more adequate than SH students did. This was consistent with Perrone (1973) who found that "Using Capabilities" and "Fulfillment" were of more concern to grade 9 and 10 students than to grade 11 and 12 students. Perhaps as students approach their entry into the world of work, they become less confident of their preparation than students who are farther away.

JH students also rated employers more positively than SH students on the Positive Employer Characteristics scale, and they rated the Money factor as slightly more important than the SH students. The latter finding agrees with Wijting (1977) where the Grade 9 sample was generally extrinsically oriented, rating "Pay" at the top of their value system.

SH students were higher on Interest and Variability, Confidence, Locus of Control, and Independence than the JH group. Other studies (Dipboye & Anderson, 1959; Wijting, 1977) have found similar results for Interest and Variability, but a somewhat puzzling finding was the difference between the two groups on Confidence. The SH group had a higher Confidence mean, but they also had a higher Locus of Control mean, indicating that they tended to see obtaining and holding a job as being less in their control than the JH students. Perhaps the

SH group is showing a growth toward a realistic assessment, and the JH group is idealistic.

In general, the differences between the two groups made some sense in terms of the kinds of experiences that two groups would have encountered up to this point. The greater likelihood of having had work experience in the SH group would perhaps tend to temper their judgment.

Sex Differences

Sex differences occurred on all but three subscales. In general, girls rated Job Security, Independence, Ambition and Money as being less important than boys did. These findings are consistent with the various findings of Perrone (1973), Smithers (1975), Gade and Peterson (1977), Dipboye and Anderson (1959), Wijting (1977), and Hales and Hartman (1978).

Girls rated Interest and Variability higher than boys and were more negative on Laziness than boys. The findings on Interest and Variability seem similar to findings on Interesting Work, Expressing Ideas, Fulfillment, Activity, Involvement and Task Satisfaction which are variously found in Dipboye and Anderson (1959), Thompson (1966), Perrone (1973), Wijting (1977), and Hales and Hartman (1978).

Girls tended to rate the Social aspects of work as being more important than did boys. Again, these findings were similar to those of Dipboye and Anderson (1959), Thompson (1966), Perrone (1973), Smithers (1975), Gade and Peterson (1977), Hales and Hartman (1978), and Mietus (1978).

Internal factors related to holding jobs seemed more important to girls than to boys, a finding which agreed with those of Gade and Peterson (1977) and Wijting (1977).

Finally, girls seemed more moderate in their opinions on Unemployment than boys, and on General Attitudes Towards Earning a Living, they appeared to have a more positive opinion.

It seems clear from the results of this study, that the girls' opinions reflect a male dominated view of the work environment. Although the differences are not great, all of the sex differences are in the direction of a traditional system. These results are consistent with Sayer's (1980) study of 93 grade 9 girls in Toronto. She found that over 45% of all career aspirations were "traditional," about 34% were "moderate," and the remainder, "non-traditional." She concluded that, "A large percentage of girls are still aspiring to traditional occupations and life styles." In spite of the general and often persuasive efforts of the North American feminist movement, little impact on the work related opinions of Alberta girls can be detected.

Full-Time Job Differences

One-quarter of the JH group and three-fifths of the SH group claimed full-time job experience in the previous summer. Differences between the groups having job experience and those without the experience occurred on seven subscales. (Significant differences are shown in Table 3.)

Students with full-time work experience rated Preparation lower, and they seemed to rate Interest lower than the other group. They were less severe in their ratings of employers in terms of Negative Characteristics, but they were more severe in their assessment of Unemployment. The people with full-time experience

rated the importance of Money more highly than the other group; they had more Confidence, and they rated employers more positively. All of these findings seem consistent with the hypothesis that full-time work experience may give students a more realistic perspective on the world of work. In no case were the differences great and, generally speaking, one would have to say that both groups appeared to possess reasonably healthy attitudes towards the world of work, both in terms of their own likelihood of success and in terms of the overall social good.

Summation

The purpose of the present study was to develop an instrument for collecting students' opinions about various aspects of the world of work, and then to use this instrument to describe the opinions of Alberta high school and junior high school students. More extensive information on the development and validation activities is available (Maguire, Romaniuk & MacRury, 1979).[1]

The most pervasive finding in relation to the opinions of Alberta students is that the work ethic (at least as it is reflected in their expressed opinions) is alive and well amongst the youth of Alberta. There is a general air of optimism which is coupled with an apparent subscription to the notion that rewards are generally related to hard work. For a province in which unemployment is very low, and in which the daily newspapers have pages of "help wanted" ads describing an unbelievable variety of career opportunities, it is not surprising to find these attitudes and opinions. It would be interesting to survey areas where the economic climate is less favorable, to see if adolescents are equally as optimistic. Perhaps in these situations students' sights are lowered to match the realities of the local job market.

Notes

1. The instrument itself is available through Division of Planning and Research, Alberta Education, 9th Floor, Devonian Building, 11160 Jasper Avenue, Edmonton, Alberta T5K 0L2.

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APPENDIX

Scale Descriptions and Item Results

1. Preparation by School: Students scoring high on this scale perceive their preparation for entrance into the world of work as being adequate. School preparation is seen as appropriately job related.

		SD	D	U	A	SA
1.1	My speaking skills are good enough for me to be successful in the job that I choose.	1	10	22	51	15
1.2	I think that I will be able to meet the requirements of the job that I choose.	0	1	10	68	21
1.3	There is very little that is taught in high school that will be of use on a job. *	21	35	21	17	7
1.4	Schools are pretty good at teaching you about how to look for a job.	13	29	25	28	4
1.5	It's usually possible to get the training needed for a job.	1	5	8	71	15

(*scoring reversed)
Median 18.1 90% interval 14-21 Test-retest .591

2. Interest and Variability in Jobs: Students scoring high seek jobs that are interesting, challenging and varied.

		SD	D	U	A	SA
2.1	I would like a job which is a challenge to my abilities.	0	2	8	48	42

2.2	I would like to find a job where you have to keep your mind active.	1	2	11	63	23
2.3	I would like a job that is interesting.	0	0	2	34	63
2.4	If my job got boring, I would quit.	7	28	46	16	4
2.5	I would like a job that has some excitement associated with it.	0	1	4	62	33

Median 20.1 90% interval 18-23 Test-retest .57

3. Diligence: Students scoring high have attitudes favorable to hard work, regardless of supervision.

		SD	D	U	A	SA
3.1	I would like a job where the harder you work, the higher your salary becomes.	1	7	14	42	36
3.2	A person should feel a little ashamed for doing a sloppy job.	2	5	8	55	30
3.3	One of the most important things about a job is to know that you are doing the best you can.	0	1	3	41	55
3.4	A person should try to do a good job whether or not the boss is around.	0	1	3	47	49

3.5	I am prepared to work hard for good wages.	0	1	3	48	47

Median 21.5 90% Interval 19-24 Test-retest .46

4. Laziness: Students who have high scores on this scale indicate attitudes of getting as much as possible for as little effort as possible.

		SD	D	U	A	SA
4.1	Nowadays there is not enough work to go around for everyone, so I'll not worry too much about getting a job.	44	42	10	3	1
4.2	I would like a job that allows you to daydream while you work.	32	51	11	6	1
4.3	Wasting time on a job wouldn't bother me very much.	24	47	18	9	2
4.4	After you have worked for several months, you have every right to quit your job and go on unemployment insurance.	43	38	12	5	1
4.5	Frankly, when I get a job I don't really want to work very hard.	34	43	14	6	2

Median 9.3 90% Interval 6-14 Test-retest .65

5. Job Security: This scale describes students who value job security, often over other characteristics of jobs.

		SD	D	U	A	SA
5.1	I would like a job that I can work at for several years.	1	4	14	40	40
5.2	I would like a job that is still mine when other people are being laid off.	1	3	12	39	45
5.3	One of the most important things about a job is to be able to keep it as long as you want it.	2	9	15	51	24
5.4	I would like a job where it is difficult to be fired.	3	23	33	35	7
5.5	It's better to hold on to a boring job than to risk changing to a new one.	17	44	26	12	1

Median 17.9 90% Interval 14-21 Test-retest .61

6. Positive Employer Characteristics: Students scoring high on this scale view employers as honest, fair and generally upstanding humans.

		SD	D	U	A	SA
6.1	Most employers are flexible about the way in which their employees dress, provided that the employees get the job done.	6	25	16	47	6

6.2	Employers are prepared to pay good wages in order to keep qualified staff happy.	4	19	29	41	6
6.3	Most employers are prepared to give a fair wage for an honest day's work.	1	3	10	70	16
6.4	Most employers are prepared to reward good effort.	1	7	20	59	12
6.5	Most employers are prepared to give their employees credit for their original ideas.	1	7	25	60	7

Median 18.1 90% Interval 15-21 Test-retest .58

7. Independence: Students scoring high on this scale rate the preservation of their own independence above that of other job characteristics.

		SD	D	U	A	SA
7.1	I would like a job where you can do your own thing.	2	16	21	45	16
7.2	I would like a job where the boss lets you decide how something should be done.	1	9	21	49	20
7.3	I would like a job where you can be your own boss.	2	14	32	37	14

7.4	I would move away from my home town in order to get the job that suited me.	3	8	22	45	22
7.5	I would like to be free to move from one company to another as my interests change.	3	14	33	40	9

Median 18.1 90% Interval 14-22 Test-retest .65

8. Money: Students scoring high on this scale view salary as being one of the most important determinants of a good job.

		SD	D	U	A	SA
8.1	I would like a job with high pay.	0	2	8	39	51
8.2	The more work experience you have, the higher your salary should be.	3	14	19	40	24
8.3	Few things in life are more important than a big salary.	23	34	11	21	11
8.4	To be a success you must have a job with a high salary.	19	53	14	11	3
8.5	I would like a job that allows you to make lots of overtime pay.	2	13	34	37	13

Median 16.3 90% Interval 13-21 Test-retest .62

9. Ambition: Students scoring high on this scale view striving for success as being important in the job setting.

		SD	D	U	A	SA
9.1	Opportunity for growth is more important than making friends on a job.	10	35	35	16	3
9.2	Sometimes a person will have to make sacrifices in order to get ahead in a job.	1	3	10	70	16
9.3	Sometimes you have to choose between having friends, and getting ahead on the job.	4	16	19	53	7
9.4	I see that a first job is really a stepping stone for a career.	2	12	16	50	20
9.5	Most jobs are competitive, so you have to do a better job than the next person.	2	22	24	44	8

Median 17.2 90% Interval 14-20 Test-retest .52

10. Locus of Control: Students scoring high on this scale view getting and holding a job as being largely a matter outside of their control — luck, knowing the right person, etc.

		SD	D	U	A	SA
10.1	In getting a job, it is more important to know somebody, than to know something.	32	34	14	14	5
10.2	Getting a good job is usually a matter of luck — being in the right place at the right time.	20	40	16	19	5

10.3	To be successful, it is important to know someone in the right place.	10	37	26	22	4
10.4	It is unlikely that you can get a decent job if you don't join a union or association.	14	41	31	11	3
10.5	When I am ready to go to work, I'll probably have to take what is available rather than what I really want.	5	18	23	45	8

Median 12.9 90% Interval 4-18 Test-retest .64

11. Confidence in Succeeding: High scorers on this scale are confident of their ability of getting a job and being successful.

		SD	D	U	A	SA
11.1	There are jobs available for those who want them.	2	17	13	50	17
11.2	When I finish my education, I'll be able to get the kind of job I want.	1	10	30	42	15
11.3	More than ever before, there is greater variety of job opportunities.	3	20	24	39	14
11.4	I think that I know what the requirements of most jobs are.	4	31	26	34	4

11.5	I feel confident that I will be able to handle the next step in my training.	0	1	16	68	13

Median 17.7 90% Interval 14-21 Test-retest .51

12. Negative Employer Characteristics: Students scoring high on this scale see employers as greedy and unfair — mostly concerned with looking out for their own interests.

		SD	D	U	A	SA
12.1	Employers are always trying to push their employees to work harder.	3	22	28	39	7
12.2	Most employers think that profits are more important than staff benefits.	2	17	40	33	8
12.3	Most employers don't really want to get to know their employees very well.	13	47	29	9	2
12.4	Employers seem concerned only with getting as much out of their employees for as little as possible.	6	31	37	19	7
12.5	Most employers don't want employees who have minds of their own.	9	36	29	23	4

Median 14.5 90% Interval 11-18 Test-retest .67

13. Social Relations: Students scoring high on this scale see social relations as being the important determiners of job satisfaction. They prefer working with people and a part of a team.

		SD	D	U	A	SA
13.1	I would like a job where I would deal with other people.	1	4	15	48	32
13.2	I would like a job where you work in a group with others.	1	8	21	48	21
13.3	I would like to work as part of a team.	1	8	31	47	13
13.4	One of the most important things about a job is to have the respect of the other people who work at the same place.	0	2	5	58	34
13.5	One of the most important things in a job is to have friendly co-workers.	0	3	11	61	23

Median 19.9 90% Interval 15-23 Test-retest .65

14. Attitudes Towards Unemployment: Students scoring high on this scale view unemployment as undesirable, even shameful.

		SD	D	U	A	SA
14.1	To be unemployed is shameful.	19	43	18	13	7
14.2	A person's major responsibility is to support his or her family.	1	8	11	48	31

14.3	To have a job is the duty of every Canadian.	5	23	29	33	10
14.4	All people should work.	4	23	26	33	13
14.5	Earning a living is the most important thing in adult life.	5	19	17	39	19

Median 16.4 90% Interval 12-22 Test-retest .70

15. General Attitudes Towards Earning a Living: Students scoring high on this scale have a positive attitude toward earning a living, typified by a statement "I am looking forward to earning my own way".

		SD	D	U	A	SA
15.1	The first job that I get will likely be interesting.	3	24	32	33	7
15.2	Earning a living should be fun.	2	12	22	43	21
15.3	I would rather have a job with low pay that I liked, than a job with better pay that I did not like.	3	6	22	43	26
15.4	I am looking forward to supporting myself by getting a job.	0	3	14	54	29
15.5	Most jobs are pretty interesting.	6	21	24	45	5

Median 18.1 90% Interval 15-22 Test-retest .58

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Counseling Practicum as a Facilitator of Self-Actualization

The effect of practicum experience upon self-actualization (SA) as measured by the Personal Orientation Inventory (POI) was assessed. A quasi-independent groups design compared 12 subscale scores on the POI. Thirty-seven counseling students with practicum scored significantly higher ($p<.05$) than 20 counseling students without practicum on 8 subscales. Counseling students with practicum scored significantly higher than 22 noncounseling students on 9 subscales. Counseling students without practicum were not significantly different from non-counseling students on 11 subscales. Neither length of time in the graduate program nor entering level of SA were confounded with the facilitation of SA by practicum. Present results were interpreted as indicating the facilitative effect of practicum upon SA within the counseling program of the Department of Educational Psychology at the University of Alberta.

Few clinicians deny the assertion that clinical experience can facilitate the personal growth of the therapist. Psychoanalysis has always stressed the need for the therapist to undergo psychoanalysis before becoming a practitioner (Freud, 1964). Carl Rogers (1959) explicitly describes the reciprocal relationship between client and therapist in terms of mutual growth.

Jung also realized the interactive relationship of therapist and client in analytical therapy. "In Jung's consulting room both he and patient sat opposite each other as two human beings joined in mutual consultation over an interdependent problem directed to a resolution important to both" (Van der Post, 1977, p. 120). Jung believed that even the most disturbed patients reflected fundamental aspects of therapists themselves. Equality of client and therapist was

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expressed in their right to a particular interpretation or point of view (Rychlak, 1973, p. 190). Most people who go into the practice of counseling psychology seem to do so as part of their own search for personal meaning (cf. David & Marks, 1972). The "projective hypothesis" leads one to expect that this be the case. This is compatible with the notion that the individual's search for personal meaning necessarily involves his/her relations with others as part of his/her perspective on the world.

Rogers (1959) suggests that the therapist, by manifesting self-acceptance and congruence, provides a model for the client. It seems probable that a therapist whose personal growth was progressing would provide a better model and that attempts to relate openly to the client would challenge and facilitate the growth of both. Almost any therapy that allows the client to deliver interpersonal feedback to the therapist has a propensity for facilitating the growth of the therapist (e.g., Analytical, Rogerian, and Gestalt therapies). There seems to be reason for expecting a counseling practicum experience to have an effect on the trainee's personal growth because of the interactive nature of the client-therapist relationship described above. Consequently, this study focuses upon the effect that practicum experience has upon the self-actualization (SA) of trainee counselors.

Maslow maintains that "the terms growth, individuation, autonomy, self-actualization, self-development, productiveness are roughly synonymous, designating a vaguely perceived area rather than a sharply defined concept" (1968, p. 24). He believes that the meaning of SA "can be *indicated* rather than defined, partly by positive pointing partly by negative contrast, i.e., what it is not" (1968, p. 24). Maslow uses the term SA rather than psychological health because:

> it stresses "full-humanness", — the development of the biologically based nature of man, and therefore is (empirically) normative for the whole species rather than for particular times and places, i.e., it is less culturally relative. It conforms to biological destiny, rather than to historically-arbitrary, culturally-local value-models as the terms "health" and "illness" often do. It also has empirical content and operational meaning. (1968, p. vi)

The concept of SA is an intervening variable as defined by MacCorquodale and Meehl (1948). Self-actualization is an abstraction based upon the summation of a number of empirical antecedents (the characteristics of self-actualizing people). It is also a disjunctive concept in that not all self-actualized people have all the characteristics of the abstracted prototype. Consequently self-actualized individuals may be described differently just as good novels can be described differently.

The pool of attributes from which the definition of a self-actualized person is drawn are listed by Maslow (1968) as: (1) Superior perception of reality, (2) Increased acceptance of self, of others, and of nature, (3) Increased spontaneity, (4) Increase in problem centering, (5) Increased detachment and desire for privacy, (6) Increased autonomy and resistance to enculturation, (7) Greater freshness of appreciation and richness of emotional reaction, (8) Higher frequency of peak experiences, (9) Increased identification with the human species, (10) Changed (improved) interpersonal relations, (11) More democratic character structure, (12) Greatly increased creativeness, and (13) Certain changes in the value system. The most common characteristic of self-actualized people is superior perception.

The major instrument used to measure SA is the Personal Orientation Inventory (POI) (Shostrom, 1964). Although largely based upon the definition of

SA provided by Maslow, it is a theoretical hybrid containing ideas from Humanistic Existential and Gestalt psychology (cf. Shostrom, 1974). The POI comprises two major scales, inner directedness (I) and time competence (Tc), and 10 subscales: self-actualizing value (SAV), existentiality (Ex), feeling reactivity (Fr), spontaneity (S), self-regard (Sr), self-acceptance (Sa), nature of man (Nc), synergy (Sy), acceptance of aggression (A), and capacity for intimate contact (C).

Although the POI has been used in a number of studies to assess the relationship between SA and counselor effectiveness, few studies appear to have examined the effect of a counseling practicum upon the SA of trainee counselors. Melchers (1972) found that most students enrolled in a counseling practicum experienced a greater growth in SA than most students enrolled in the regular classes. However, scores on the POI for the practicum students were significantly greater ($p<.05$) only for I, Ex, and Fr. Anderson (1970) also found that those students involved in a counseling practicum experience made significant gains towards SA.

Naar (1974) found that students enrolled in a counseling skills program which included mock therapy, didactic sessions, review of taped sessions, exercises borrowed from psychodrama, and encounter groups showed significant ($p<.05$) differences on 10 POI scales when compared to a control group.

Bonk, Knapp and Michael (1978), using the Personal Orientation Dimension (an instrument similar to the POI) found that school counseling trainees showed significant increases on four of the 13 subscales ($p<.05$) after a training course.

The present study was designed to assess whether counseling practicum within the Department of Educational Psychology at the University of Alberta facilitates SA as measured by the POI. There are two aspects to this question. One is the theoretical question of whether practicum experience facilitates SA and thus supports the validity of the construct, while the other is the practical question of whether a specific component of a specific program facilitates SA.

It was hypothesized that: (1) counseling students who have practicum experience score higher than counseling students without practicum experience on the scales of the POI, (2) counseling students with practicum experience score higher than noncounseling students on the scales of the POI.

Method

Description of practicum and the possible facilitation of SA

The practicum includes lectures, workshops, seminars, practicum placement, and supervision. The lectures take up four hours per week and deal with specific skills enabling counselors in training to move quickly to their practicum placements. The students are exposed to a variety of theoretical perspectives and clinical techniques.

A variety of three-hour workshops are held weekly providing the students with practical experience (e.g., vocational counseling, play therapy, biofeedback, hypnosis, and relaxation). Occasional optional weekend workshops, such as a Transactional Analysis Script Workshop, are also offered. Methods include didactic sessions, role-plays of therapy sessions, feedback from students playing the role of clients, review of taped sessions, and various self-awareness exercises.

Another part of the practicum experience is the seminar program. Early in the year the students are divided into smaller interest groups which meet weekly for

one and one-half hours. The seminar leaders work closely with students, assessing videotapes, answering questions about various types of counseling situations, and dealing with problems as they arise in the course. The seminars provide an opportunity for peer consultation and support.

Practicum students also participate in a field placement of a minimum of one-half day per week. Half of the placement is served at the counseling center clinic within the Educational Faculty, while the remainder is served at other agencies outside the university. At least one hour per week is spent in supervision. Supervision within the Clinic is handled by faculty while outside the clinic, practising counselors and psychologists are invited to supervise students. Supervision includes case discussion, audio and videotape analysis.

Usually, the first counseling theory that practicum students encounter is that of Carl Rogers. Thus the student is exposed to a view of people as essentially good. A student who accepts this view may resolve the good-evil, masculine-feminine, selfish-unselfish dichotomies in the nature of people and may score higher on the Nc and Sy scales.

Exposure to Roger's client-centered therapy means that student counselors need not have all the answers or try to become rescuers. Thus trainees may be more likely to accept their deficiencies as therapists. This may lead to an increased Sa score.

Later in the term, students are systematically exposed to alternative counseling systems, learning to apply principles from several of these systems to counseling practice. This may lead to higher Ex scores.

A goal of the practicum is to encourage students to develop their own counseling style. The emphasis is upon being authentic. This freedom to be oneself may lead to elevated S, Sa, and Sr scores.

Practicum instruction in "micro-skills" such as empathic understanding, respect or positive regard, and facilitative genuineness, via role-playing and feedback, may lead to higher scores on Fr, S, Tc, Sr, Sa, and A scales. Trainees utilizing these skills may also be more likely to develop a warm interpersonal relationship with their clients and thus increase their C scores.

Early field experience may lead trainees to become more self-aware rather than to rely upon preconceptions of themselves. The trainees have a chance to assess the relationship between their expectations and the reality of counseling. This kind of experience may lead to an increase in S and may also result in trainees learning to live with uncertainty and become more present-centered, thereby increasing Tc. The students may learn to tolerate more ambiguity and see the relationships of opposites in a meaningful way, increasing Sy.

Being placed in a helper role may enhance the trainee's feelings of self-regard and self-acceptance. By helping others, trainees may facilitate this personal growth. The acceptance of others may facilitate the trainees' acceptance of themselves.

Clinical experience may lead to self-knowledge in that students may "see" themselves reflected in their clients. They may learn to cope with their clients' unpredictable emotional states as well as their own. They may begin to discover their own fears and inadequacies. The reciprocal relationship between client and therapist may contribute to the student counselors' own growth as well as that of their clients. Clinical experience may lead to increased objectivity of observations of both self and others. The trainees may become better judges of people or

perhaps learn to suspend judgement and be suspicious of their own perceptions. By learning to avoid premature conclusions and identify their own biases, the trainees may appreciate the need to allow a picture of the counselor-client relationship to develop spontaneously. The emphasis is upon seeing what is there and what is happening rather than the counselors projecting their own expectations and biases into their perceptions of themselves and their clients. This type of experience may lead to an increase in Sy, C, S, Ex, and Tc.

Some aspects of the counseling program may facilitate self-awareness and lead to a higher level of SA. Videotaping of sessions with clients offers trainees an excellent opportunity for self-observation. It allows them to "step outside themselves" and perhaps see themselves as others see them. The trainees may become aware of some of their habits (i.e. talking too much; asking questions which can be answered by yes or no rather than open ended questions; avoiding eye contact; nervous shifting of the body, etc.).

Examination and discussion of videotapes is designed to promote retroactive and future self-awareness of feelings, thoughts, and bodily movements during therapy. This encourages the trainees to be both present-centered (Tc) and sensitive to their feelings (Fr).

The trainees get feedback on their areas of strength (Sr) and weakness (Sa). The practicum trainees are placed in a double bind of having to cope with the conflict of being a student, client, and a therapist to clients. These paradoxical roles create anxiety which increases until the individual experiences growth, i.e., sees the dichotomies as meaningfully related (Sy) (David & Marks, 1972). A supervisor may help trainees accept themselves as knowledge of their limitations increases (Sa) and begin the ongoing process of growth with less anxiety. A high level of congruence between supervisor and trainee may provide a model for trainee-client interactions. Such a nurturant relationship between supervisor and trainee may lead to an increase in C, Sa, Sr, A, and S.

Subjects

The subjects were 79 graduate students from the Department of Educational Psychology at the University of Alberta. There were 37 counseling students who had completed the counseling practicum, 20 counseling students who had not yet taken the practicum, and 22 noncounseling students. Subjects participated in this study between March and September 1978.

Procedure

A letter was sent to current graduate students in the Department of Educational Psychology at the University of Alberta explaining the purposes of the study and requesting their cooperation by the completion of the POI. Testing sessions were arranged at the convenience of the subjects. Subjects were asked to indicate whether they were in their first year of the program or whether they had been in the program for more than one year.

Design

A quasi-independent groups experimental design was employed in order to minimize some of the sources of internal invalidity associated with the possible pre- and posttreatment administration of the POI (see Campbell & Stanley, 1963). The counseling students without practicum experience and the noncounseling students (without practicum) served as two control groups.

The three groups were divided into two levels (first year or longer than one year in the program) to form a 3x2 factorial design to determine whether a student's stage in the graduate program might be a confounding factor with the possible facilitation of SA.

Results

Twelve two-way analyses of variance were performed on subscale scores on the POI for the three groups over two levels of year in the graduate program. None of the 12 tests for interaction between the main factors were significant. The main effect of year in the program was not significant for separate analyses using 12 dependent variables (POI subscales). It was established, from these results, that the length of time in the graduate program did not affect SA and thus was not confounded with the possible facilitation of SA by practicum experience.

The results of the planned comparisons between the three subject groups on the 12 subscales of the POI are shown in Table 1. Counseling students with practicum scored significantly higher than counseling students without practicum ($p<.05$) on eight subscales (Tc, I, SAV, Ex, Fr, S, A, C). Counseling students with practicum scored significantly higher than noncounseling students on nine of the 12 subscales (Tc, I, SAV, Ex, Fr, S, Sr, A, C). Counseling students without practicum were not significantly different from noncounseling students on the 12 POI subscales with the exception of Sr. From these analyses, it is shown that counselors with practicum experience tend to be more self-actualized (as measured by the POI) than noncounseling students or counseling students without practicum experience.

TABLE 1

COMPARISON OF COUNSELING STUDENTS WITH PRACTICUM, COUNSELING STUDENTS WITHOUT PRACTICUM, AND NONCOUNSELING STUDENTS ON POI SCALES

Dependent Variable		Groups						Comparisons		
		(1) Counselors with Practicum		(2) Counselors without Practicum		(3) Noncounselors		1-2	1-3	2-3
		M	SD	M	SD	M	SD	t	t	t
Time Competent	Tc	19.91	1.63	18.65	3.42	18.09	4.25	1.89*	2.34*	0.46
Inner Directed	I	101.89	8.74	95.85	11.42	91.36	13.83	2.23*	3.58*	1.13
Self-Actualizing Value	SAV	23.08	1.75	21.95	2.74	20.50	3.90	1.89*	3.48*	1.38
Existentiality	Ex	21.00	2.61	19.35	3.40	19.45	3.68	2.04*	1.87*	0.09
Feeling Reactivity	Fr	18.81	2.51	17.50	2.43	16.95	3.34	1.89*	2.42*	0.59
Spontaneity	S	15.18	1.83	13.90	2.33	12.59	3.33	2.29*	3.86*	1.45
Self-Regard	Sr	14.37	1.25	13.95	2.03	12.59	2.40	0.98	3.75*	1.96*
Self-Acceptance	Sa	19.32	3.00	18.05	3.50	17.77	4.30	1.44	1.62	0.22
Nature of Man	Nc	12.59	1.72	12.55	1.90	12.13	1.88	0.08	0.95	0.70
Synergy	Sy	7.89	0.93	7.65	1.38	7.59	1.18	0.78	1.08	0.14
Acceptance of Aggression	A	18.72	2.64	17.30	2.57	16.31	3.83	1.96*	2.85*	0.96
Capacity for Intimate Contact	C	22.86	2.91	20.95	2.83	20.77	3.67	2.38*	2.41*	0.17

$p<.05$ (one-tailed test)

The facilitation of SA, as indicated by examination of the data, is more likely to be attributable to practicum experience than unrelated to practicum experience. The contention that practicum experience in general can facilitate SA and that,

specifically, practicum experience facilitates the SA of counseling students in the Department of Educational Psychology at the University of Alberta is supported in the foregoing pattern of results.

The scores for the three groups are largely within the normal range. All three groups are below the normal range on Ex. The largest differences between the counselors with practicum and the other groups occur on Tc, I, SAV, Fr, S, A, and C. These are variables which have been shown to be predictors of counselor effectiveness (Foulds, 1969a, 1969b, 1969c). All groups had depressed scores on Ex and Nc. This pattern is characteristic of many profiles shown in the POI manual.

Discussion

The hypotheses of this study were supported by the results. However, the extent of the support is open to interpretation. Significant differences between the counseling students with practicum and the other two groups of students occurred on eight or nine of the twelve subscales, depending on the groups compared. Because of the disjunctive nature of the concept of SA, significant differences would not be necessary on all of the 12 subscales in order to suggest a meaningful difference in SA between the counseling students with practicum experience and the other groups. The number of scales on which significant differences need to be obtained to create a meaningful distinction between groups in terms of SA is subject to opinion. Nevertheless, significant differences between groups occurred on the two most important subscales (Tc, I). The data suggest that practicum experience within the counseling program of the Department of Educational Psychology at the University of Alberta facilitates SA. Length of time in the program and entering level of SA of counseling trainees are not confounding factors in the present data. The ability of POI scales to discriminate between counselors with and without practicum experience also enhances the construct validity of the instrument.

The substantial number of significant differences on the subscales of the POI between counselors with practicum and counselors without practicum is compatible with Fould's studies (cited previously) which showed a significant correlation between SA and counselor effectiveness (the ability to show empathic understanding, positive regard and facilitative genuineness). There is at least prima facie evidence for believing that practicum experience facilitates the development of these counselor characteristics.

There were no significant differences between the three groups on the subscales of Nc and Sy. The failure of these two subscales to discriminate between groups in this study may have been partly due to their questionable reliability (cf. Oakland, Freed, Lovekin, David & Camilleri, 1978; Kay, Lyons, Newman & Mankin, 1978). Perhaps both scales need an increase in the number and nature of items or possible deletion from the POI.

A departure from previous studies of the effect of practicum experience upon SA was the use, in the present study, of a quasi-independent groups design. This reduced the possibility of source internal invalidity associated with repeated measures designs using the POI. The internal consistency of the POI across all groups in this study was high (Cronbach's $\alpha = .87$) suggesting that the POI measures were reliable as a whole. The present design was also necessitated by the fact that trainees within the program were spread across various stages as full or part-time students proceeding at different rates. Alternative designs would have

presented great practical difficulties. As is the case in many field studies, the present design is a compromise. A MANOVA followed by ANOVA would have determined the probability of experimenter-wise error; however, the number of subjects available was too small to apply meaningfully such an analysis with 12 dependent variables. The present results need to be interpreted in relation to these considerations.

Earlier findings which have indicated a positive relationship between practicum experience and subscales of the POI (Anderson, 1970; Bonk et al., 1978; Melchers, 1972; Naar, 1974), are supported by the results of this study. From these four studies, the strongest evidence of a relationship between SA and a practicum type experience were produced by Naar, in which he reported significant increases on 10 POI subscales.

On the basis of Naar's results and the results reported here, it is suggested that practicum experience may facilitate SA. An association has also been established by Foulds between SA and counselor effectiveness. Consequently, it can be argued that an emphasis upon the personal growth of counseling trainees during practicum may lead to increased SA and counselor effectiveness. This hypothesis remains an empirical question.

The paucity of research on the effects of practicum experience upon the personal growth of counselors points to the need for expanded research in this area. Although the present study is an indication that practicum experience tends to facilitate SA, it is not clear which of the many components described earlier are responsible and to what degree. Experimental manipulation of such components within research designs offers a possibility for answers to these questions. However, administrators of counseling programs are primarily concerned with the pragmatic realities of educating practitioners rather than risking the possible dislocation of their programs in the interest of researching such questions.

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Cognitive Processing, Intervention and Achievement

Two control and two experimental classes (n=94) were given a battery of tests to measure simultaneous and successive processing. Two classes were given an intervention programme specifically designed to improve simultaneous processing. At the end of the intervention, all classes were again given the battery of marker tests and achievement measures were obtained in reading, spelling and arithmetic. An examination of the factor matrices showed no changes in cognitive structure due to the intervention although individual marker tests did show a significant change. There was also a significant change in arithmetic and reading achievement scores. The results were discussed in terms of Luria's functional processing units model.

On the basis of behavioral observations of patients with localized cortical lesions, Luria (1966a, 1966b) proposed two modes of information integration, simultaneous and successive, and delineated their cortical locations. Simultaneous processing, according to Luria, involves the synthesis of separate elements into quasi-spatial groups with all parts of the synthesis being surveyable. This type of synthesis is required in the formation of gestalts as well as the determination of verbal and nonverbal relationships between two or more objects. This function is carried out in the parietal-occipital regions of both hemispheres of the brain. Successive synthesis is characterized by the integration of discrete elements into groups based on a temporal ordering. The entire synthesis is not accessible at any one time; instead, individual elements can be accessed only by the preceding

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element. Each element maintains an intrinsic independence to all other elements within the series, and acquires meaning only in terms of the entire sequence. This type of synthesis, located in the fronto-temporal areas of both hemispheres, is utilized in the automization of skilled movements and narrative speech. Both these processes are functional aspects of one unit, namely the information integration unit. Luria also distinguishes two other units, the arousal or regulatory unit and the planning or control unit.

Factor analytic studies have shown that simultaneous and successive integration appear to be viable individual difference variables (Das, Kirby & Jarman, 1979; Randhawa & Hunt, 1979; Hunt, 1980). It follows, therefore, that disparities in cognitive behavior may be the result of differing information processing modes — i.e., the two types of synthesis, simultaneous and successive, can be viewed as components in the processing of information and thus their appropriate use in task performance could be a determinant, in part, of individual achievement.

It has been shown that differing levels of achievement are produced by the differential use of simultaneous and successive processing (Kirby & Das, 1978; Hunt, Fitzgerald & Randhawa, 1976; Hunt & Randhawa 1980). This implies that appropriate usage of process strategies could result in greater achievement. A process interpretation of the intellect also suggests that cognitive strategies may have been learned and, therefore, may be amenable to change. In their studies, both Kaufman (1978) and Krywaniuk (1974) suggest that successive processing strategies are amenable to instruction. If training in process strategies, therefore, does result in higher achievement, there are definite implications for education in the area of curriculum development, classroom grouping, and instructional methods.

Das, Kirby and Jarman (1979) suggested three alternative approaches for intervention programs: (a) improving the processes by designing programs that would encourage the development of improved processing abilities, (b) providing alternate educational environments which would use the individual's processing strengths to complete tasks successfully, (c) teaching strategies which would help individuals to employ optimum processes for a task. Krywaniuk and Das (1976) and Kaufman (1978) reported success in improving successive processing by teaching appropriate strategies; however, in the Krywaniuk (1974) study there is a large overlap between the intervention procedures and the pre- and posttest assessment devices, which may well have accounted for the obtained significant changes. Simultaneous processing has been shown to link with achievement, especially in reading and arithmetic (Kirby & Das, 1978; Hunt & Randhawa, 1980). Furthermore, Hunt (1980), in a study on intentional-incidental learning, showed that simultaneous processing is more powerful than successive processing in terms of incidental learning, therefore, it would seem natural to investigate the possibility of intervention in the simultaneous mode.

The present study was undertaken, firstly, to determine if an average grade four population could benefit from a program designed to improve simultaneous processing where the program was designed, as far as was possible, to provide specific exercises which were unlike the assessment procedures, and secondly, to determine if an improvement in simultaneous processing would result in a corresponding improvement in achievement scores.

Method

Subjects

The present study involved four classes of grade four students from four separate schools chosen from a rural school unit in Saskatchewan. Two of these classes formed the experimental group ($n=48$) with a mean age of 116.9 months. The other two classes formed the control group ($n=46$) with a mean age of 117.2 months. No attempt was made to equate the classes on any variables.

Instruments

Raven's Colored Progressive Matrices, Figure Copying, French Copying Test, and the Matrix Test were used to measure simultaneous processing. Successive processing was measured by the Serial Recall Test, Digit Span Test, and the Visual Short-Term Memory Test. These tests were chosen as measurement devices on the basis of past research (Das, Kirby & Jarman, 1979; Hunt, 1980). The Wide Range Achievement Test (WRAT) was used to determine pre- and post-intervention levels of achievement.

Matrix Test. This visual task was developed by Fitzgerald (1971) to measure simultaneous processing. It consists of 20 individual presentations of shapes which are drawn on three by three dot matrices. The child is required to reproduce, on a supplied dot matrix, the pattern turned through 90 degrees to the right. The matrix test was developed from the statement that disturbance of spatial synthesis is especially prominent when the subject is asked to invert and then draw a presented figure (Luria, 1966a). The total score is the number of patterns correctly drawn (Hunt, 1980)

French Copying Test. This test was adopted from the copying test of the French, Ekstrom, and Price (1963) Kit of Reference Tests for Cognitive Factors. The student is given a pattern and asked to reproduce the pattern in a supplied five by five dot matrix. In this test the student is allowed to view the original pattern the whole time. The score is the number correctly copied.

Raven's Colored Progressive Matrices. This test was devised as a culture-fair measure of reasoning ability, and consists of 36 items of increasing difficulty (Raven, 1956). The tasks are visually presented as a series of patterns, with one section omitted. The child is required to complete the pattern by choosing the appropriate match from several alternatives. The total score on this test is the number of correct items.

Figure Copying. This test was developed by Ilg and Ames (1964) to measure developmental readiness. The child is required to copy 10 geometrical forms of increasing difficulty. Each of the drawings is scored as 0, 1, or 2 according to the degree of correctness of the reproduction.

Serial Recall Test. This test consists of a set of 24 word lists; 12 contain words which are acoustically similar to one another, and the other 12 contain four unrelated words (Das, Kirby & Jarman, 1979). The two types of word lists are randomly ordered in the test. After each list, the subject is required to write in the correct order as many words as can be recalled.

Visual Short-Term Memory Test. This visual task consists of 20 separate presentations of five single-digit grids (devised by Howarth and Brown at the University of Alberta). Each grid is presented for five seconds, followed by a neutral filler task of color naming for two seconds which prevents rehearsal of the grid. Each digit correctly placed is scored as one mark.

Digit Span Test. This test consists of 16 lists of digits of increasing lengths, two of each length. After each list is presented, the subject is required to recall the items in the order given. The total score is the maximum list length recalled.

Wide Range Achievement Test (WRAT) This test was designed by Jastak and Jastak (1978) to measure achievement in word recognition, spelling, and arithmetic. The authors report a split-half reliability of .92 to .98 for reading and spelling tests and from .85 to .92 for the arithmetic test.

Procedures

The present study consisted of three phases: the pretest phase, the treatment phase, and the posttest phase. During the pretest phase the experimental and control group received the above battery of tests measuring simultaneous and successive processing and achievement.

During the treatment phase, the experimental group received a minimum of sixteen instructional hours over a period of sixteen weeks in activities designed to improve simultaneous processing. The intervention was implemented by the individual classroom teachers and consisted of exercises which provided the children practice in forming verbal and nonverbal relationships by linking items of information into a surveyable array and making inferences from the whole. Complete details of the intervention programme are contained in Leasak (1980). The senior author, through a series of inservice workshops, briefed each teacher about the instructional materials and procedures prior to the intervention. The control group did not receive any treatment.

During the posttest phase, the experimental and control groups received the same battery of tests to measure simultaneous and or successive processing and achievement. These were given over a period of three weeks immediately after the intervention treatment was completed.

Results

Intercorrelations of the seven pretest scores are presented in Table 1.

TABLE I

INTERCORRELATION MATRIX AMONG SEVEN PRETESTS FOR THE TOTAL GROUP (n=94)

	1	2	3	4	5	6	7
1. Progressive Matrices	100[a]	42	29	25	20	46	54
2. Figure Copying	42	100	32	28	19	50	51
3. Serial Recall	29	32	100	34	45	37	16
4. Digit Span	25	28	34	100	43	24	11
5. Visual S.T.M.	20	19	45	43	100	20	12
6. French Copying	46	50	37	24	20	100	56
7. Matrix	54	51	15	11	12	56	100

[a] Rounded to two places with decimal omitted.

An iterative principal factor analysis followed by a varimax rotation was performed on the correlation matrix. Only the principal components with eigenvalues greater than 1 were retained for the subsequent iterative principal factor analysis. As in previous research (Randhawa & Hunt, 1979; Hunt, 1980), two factors emerged which were labeled simultaneous and successive. The results of this analysis are presented in Table 2.

TABLE 2

VARIMAX FACTOR LOADINGS FOR THE SEVEN PRETESTS FOR THE TOTAL GROUP (n=94)

Variable	Simultaneous	Successive	h^2
1. Progressive Matrices	62[a]	23	43
2. French Copying	68	25	52
3. Figure Copying	61	26	45
4. Matrix	83	-002	69
5. Visual S.T.M.	08	70	49
6. Digit Span	16	57	35
7. Serial Recall	25	61	43

[a] Rounded to two decimal places with decimal omitted.

The pretest and posttest scores for the control group and experimental group were also intercorrelated and the resulting correlation matrices were subjected to iterative principal factor analysis followed by a varimax rotation. The resulting factor matrices were subjected to Cliff's (1966) congruence procedure. This procedure compared, first, the factor matrix of the pretest scores for the control group with the factor matrix of the posttest scores for the control group and, second, the factor matrix of the pretest scores for the treatment group with the factor matrix of the posttest scores for the treatment group. The coefficients of congruence for each factor and for each group are reported in Table 3.

TABLE 3

CONGRUENCE COEFFICIENTS FOR TREATMENT AND CONTROL SIMULTANEOUS/SUCCESSIVE FACTOR MATRICES

Comparison Groups	Simultaneous	Successive
Precontrol vs. Postcontrol	.93	.90
Pretreatment vs. Posttreatment	.98	.92

A coefficient of congruence gives an indication of the extent to which the criterion and interest matrices are similar. If the intervention had had any effect on the underlying cognitive processes, then the pretest control group comparison of the factor matrix should show high similarity whereas the pre-post treatment comparison should show less. The obtained coefficients are evaluated subjectively

because a statistical test of significance is not available. Evans (1970) suggested that coefficients of .90 or higher are an indication of good correspondence; coefficients of .80 to .90, show fair correspondence; coefficients from .70 to .80, poor correspondence; and coefficients less than .70, no correspondence between a pair of factors. Based on these criteria, the data in Table 3 suggest that the pretreatment and posttreatment factor structures for the control and experimental groups are very similar. Therefore, it follows that the intervention does not appear to have changed the underlying factor structure or the cognitive processes common to the set of tasks used to define this structure.

A further analysis was carried out by a series of three-way ANOVA's to determine the specific effects of the treatment on the marker tests. The first factor was treatment (intervention-control), the second factor was classroom (four nested classrooms), and the third factor was repeated (pre-post raw scores of each of the simultaneous-successive marker tests). An interaction between the intervention-control and pre-post measures can be interpreted to mean that the intervention was successful. A summary of the series of analyses of variance for each marker test is given in Table 4; the class means, in Table 5. A further series of analyses of each of the posttest marker scores using the corresponding pretest marker scores as covariates gave similar results to the repeated measures analyses; however, only the results of the repeated measures analyses are reported in Table 4 in order to allow a comparison with the Kaufman (1978) results.

TABLE 4

SUMMARY OF ANOVAs FOR MARKER TESTS:
CLASSES NESTED UNDER TREATMENT

Variable	F(d.f.)[a]				
	A (Treatment)	B (Class)	AB	C (Repeated Measure)	AC
Progressive Matrices	--	--	--	22.75***(1,92)	--
French Copying	6.32*(1,92)	--	--	55.05***(1,92)	(1.45: $p<.2$)
Figure Copying	--	--	--	--	6.99**(1,92)
Matrix	--	--	--	47.93***(1,92)	3.88*(1,92)
Visual S.T.M.	--	3.44*(3,90)	--	6.51*(1,92)	7.08**(1,92)
Digit Span	--	--	--	45.53***(1,92)	--
Serial Recall	--	3.57*(3,90)	--	67.73***(1,92)	--

[a] The first value is the numerator d.f. and the second value is the appropriate error d.f.

* $p<.05$
** $p<.01$
*** $p<.001$

TABLE 5

TABLE OF MEANS OF MARKER VARIABLES

Variable	Control			Experimental		
	Class 1	Class 2	Combined	Class 1	Class 2	Combined
Progressive Matrices	27.7 (30.5)*	29.7 (30.8)	28.7 (30.7)	30.0 (32.0)	29.7 (30.8)	29.8 (31.5)
French Copying	12.7 (16.3)	14.3 (17.2)	13.5 (16.7)	16.3 (20.4)	15.3 (20.1)	15.8 (20.2)
Figure Copying	12.1 (10.3)	12.4 (12.1)	12.3 (11.3)	12.9 (12.4)	11.2 (12.0)	11.9 (12.3)
Matrix	5.0 (8.0)	6.3 (9.2)	5.7 (8.7)	7.0 (8.9)	6.6 (8.1)	6.8 (8.4)
Visual S.T.M.	52.4 (49.7)	61.0 (63.0)	56.9 (56.7)	44.7 (61.1)	62.8 (73.5)	59.7 (68.0)
Digit Span	4.6 (5.1)	4.1 (5.0)	4.5 (5.0)	4.5 (5.4)	4.5 (5.4)	4.5 (5.4)
Serial Recall	40.7 (52.8)	54.0 (61.5)	47.6 (57.3)	41.3 (56.3)	50.0 (54.2)	46.2 (55.1)

* Posttest measures

A series of two-way (treatment x class) ANOVA's with classes nested under the treatment was performed to test for significant differences between the control group and the intervention group on the spelling, reading, and arithmetic raw scores. The analysis of the data indicated that there was no significant difference between the intervention and the control group on the spelling variable but there were significant differences between the intervention group and the control group on reading [$F(1,89)=5.42$, $p<.05$] and arithmetic [$F(1,89)=6.89$, $p<.05$] with significant interaction on reading [$F(2,89)=4.02$, $p<.05$] and arithmetic [$F(2, 89)=6.29$, $p<.01$]. Table 6 gives a summary of the unadjusted and adjusted means.

TABLE 6

TABLE OF ADJUSTED AND UNADJUSTED MEANS OF ACHIEVEMENT VARIABLES FOR EACH CLASS

Variable	Control			Experimental		
	Class 1	Class 2	Combined	Class 1	Class 2	Combined
Arithmetic	31.2 (30.6)[a]	31.1 (31.3)	31.2 (31.0)	32.9 (33.1)	31.3 (31.5)	32.1 (32.2)
Spelling	44.8 (44.0)	44.0 (45.4)	44.4 (44.7)	44.1 (42.7)	45.5 (46.0)	44.8 (44.6)
Reading	69.4 (67.1)	67.2 (69.1)	68.3 (68.2)	69.4 (67.4)	69.5 (71.3)	69.5 (69.6)

[a] Unadjusted means

Discussion

In past research, simultaneous and successive modes of information processing have been shown to be stable variables in the examination of individual differences across varying samples (Das, Kirby & Jarman, 1979; Randhawa & Hunt, 1979; Hunt, 1980). Further supporting data in this regard are presented in this study.

A process interpretation of cognitive functioning suggests that specific processes may be amenable to change and thus an important aspect of the simultaneous-successive processing model, and more generally, the process view of cognition, is whether this change can be brought about. In the light of the results of the factor rotations, it would appear that the factor structure and hence underlying cognitive processes are invariant. However, the rotation and matching of factor matrices involves a match of one structure to another at a level which may not be sensitive enough to show slight variations. An examination of Table 4 does show that the intervention was effective on two of the simultaneous marker tests (Figure Copying and Matrix), and unsuccessful with one other (Raven's). The French Copying marker test, although showing change, gave a significant treatment x repeated measure interaction only at the 0.2 level. Similar to the Kaufman (1978) and Krywaniuk and Das (1976) studies, the Raven's raw scores in the present study were not improved by the intervention, although Krywaniuk and Das note that more than two-thirds of the scores in their study were above the fiftieth percentile after the intervention. They attribute this change to the attention to visual exercises designed to improve the successive processing in their intervention program; however, the factor matrix reported in the Krywaniuk, and Das study shows the Progressive Matrices Test loading greatest on the successive factor before the intervention which seriously complicates the interpretation. As stated before, no change in the Raven's scores was shown in the present study. One is led to conclude that the intervention program was not successful with this marker test or that the test is not a good marker test for simultaneous processing. The Raven's was designed as a test of reasoning ability (Cattell, 1940), although Kirby and Das (1978) advise caution in viewing the Raven's as a test of "reasoning" and suggest that there is a combination of "spatial" and "reasoning." In previous studies (Hunt & Randhawa, 1980; Hunt, 1980), we have not used the Raven's as a marker test of simultaneous processing for this reason, for it would appear that the Raven's may be too complex a task to use as a marker test for simultaneous processing (Hunt, 1975). The treatment had some effect on one of the successive marker tests (Visual Short-Term Memory). Das and Molloy (1975) noted that the Visual Short-Term Memory task loaded on different factors for grades one and four and suggested as an explanation of this disparity that grade one students were not making effective use of the 5-second exposure time involved in the test. It is possible that in the present study the intervention program which, in part, required children to look at pictures for a fixed time interval and then to recall specific details of the pictures could have improved the children's effective use of time and hence improved their performance on the Visual Short Term Memory task.

The improvement in achievement in the areas of spelling and arithmetic could suggest that the intervention program had been successful, for efficiency in reading and arithmetic has been closely related to efficiency in simultaneous processing (Hunt & Randhawa, 1980). However, the significant class-achievement

variable interaction for arithmetic and reading may point to the non-comparability of the classes or differences in effectiveness of classroom teachers as a more likely source of explanation for the improvement in the achievement scores than to suggest that the intervention programme had brought about a change in cognitive processing and hence a change in achievement.

The present study was focused on improving simultaneous processing in what Luria calls the information integration unit which is primarily concerned with the input, processing, and storage of information with simultaneous and successive synthesis of information being the key functions. Flavell (1976) stresses the importance of metacognition for the successful completion of cognitive tasks. Metacognition refers, in part, to the active monitoring, regulation, and orchestration of processes involved in task completion. He implies that each individual possesses a conscious knowledge of the cognitive processes and strategies available to him. Metacognitive activity appears to be similar to what Luria sees happening in the planning unit. This control and planning unit sets goals, plans processing strategies and actions, and assesses goal attainment. Hunt and Randhawa (1980) noted that increasing the proficiency of the processors may not necessarily result in increased achievement as there may be a deficiency in the planning unit which would nullify any improvement in the processing unit. In the present study, the intervention programme, which was specifically designed to improve simultaneous processing, was partially successful; however, the improvement in achievement may not be a result of this improvement, but rather have been brought about through the effect of the intervention programme on the planning unit. Future research will need to be done to isolate the activities of these two units if a clearer picture of the intellectual activities of students during cognitive activities is to be understood.

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Using Multiple Embodiments of Place Value Concepts

The purpose of this study was to determine if using multiple embodiments rather than a single embodiment of concepts related to three-digit numbers resulted in greater understanding of selected place value concepts. Forty-two grade two pupils were randomly assigned to the two treatment levels — ME (multiple embodiment approach with coffee stirrers, Dienes' blocks, and chips) and SE (single embodiment approach with coffee stirrers only). A repeated measures design was used, with understanding and transferability measures taken on days 6, 10, 13 (posttest) and 20 (retention test) of the treatment period. Significant differences were not obtained on the Group main effect nor on the Group-by-Time interactions.

Educators typically encourage extensive use of concrete materials for teaching certain elementary school mathematical concepts. Reys (1971), after summarizing beliefs held by many learning psychologists, recommended greater use of manipulative materials in teaching mathematics. Suydam and Dessart (1976), on the basis of a review of the research concluded that mathematical ideas and skills should be developed from a concrete, physical base.

Questions concerning the use of more than one material to teach selected mathematical concepts are often raised. Dienes' perceptual variability principle, or Principle of Multiple Embodiment, specifically addressed this issue (Dienes, 1967).

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Dienes and Golding (1971) indicated that "multiple embodiment means that every concept should be presented in as many different ways as possible" (p. 54). Dienes' rationale for the principle requiring a rich variety of mathematical experiences upon which concepts can be built up by children is quite clear. He believes that by presenting multiple embodiments of a particular concept, that which is abstracted by the child will be a generalization and will not be associated with any one particular embodiment.

Wheeler (1972) examined the relationship between multiple embodiments of the regrouping concept and children's performance in solving multi-digit addition and subtraction examples. A significant difference in favor of the use of multiple embodiments of the concept was found. Beardslee (1973) and Gau (1973), however, did a pair of studies to examine the perceptual variability principle when applied to Grade 5 and 6 students learning common fraction objectives. They found no significant differences and concluded that they could not support the principle of using multiple embodiments for these concepts.

Application of the Multiple Embodiment Principle to whole number numeration concepts appears not to have been empirically tested, yet an examination of current elementary methods texts would indicate that authors routinely recommend the use of bundling sticks, base ten blocks, pocket charts and so on, to teach many of these concepts. Hence this study was designed to determine if using multiple embodiments rather than a single embodiment of concepts related to three-digit numbers resulted in greater understanding of the place value concepts with each of the concepts being investigated in such a way as to provide a measure of how well the children learned what was taught and of how well they could transfer what they learned to higher order concepts. Two specific questions were considered.

1. Would there be differential growth between two groups of children both taught the same selected two- and three-digit numeration concepts utilizing similar techniques but that one group would use three concrete embodiments of the concepts, the other group only one concrete embodiment?
2. And, in the absence of differential growth, would there be a main effect for treatment?

Method

Subjects

The study was conducted in an elementary school in a middle-class, residential community located in a rural county in Maryland. The subjects were selected from the 50 students enrolled in the Grade 2 classes of that school. On the basis of a screening procedure consisting of a criterion and a readiness test, one student was excluded from the study. The remaining 49 students were randomly assigned to one of two treatment groups. The final sample of 42 students, two groups of 21, resulted from deleting the data for any student who was absent for three or more consecutive days and, to facilitate statistical analysis by having treatment groups of equal sizes, from deleting the data from the last two students assigned to one of the groups. Group A was comprised of 10 males, 11 females and was fifteen percent non-white whereas Group B was comprised of 11 males, 10 females and was 5 percent non-white.

Day	Lesson	Single Embodiment (SE)		Multiple Embodiment (ME)	
		Material	Activities	Material	Activities
1	1	CS	Counting to 99 Grouping by tens to 99	CS	Same as SE
2	2	CS	Grouping activities to 199 10 tens = 1 hundred	CS	Same as SE
3	3	CS	Same as lesson #2 with different numbers	CS, DB	One example with CS Introduction to DB Examples with DB One example with CS and DB
4	4	CS	Grouping activities to 499	CS, DB	Half as many examples but with both exemplars
5	5	CS	Grouping activities to 999 Grouping by hundreds, use numbers with zero: e.g., 407,360	DB	Same as SE except use DB instead of CS
6		TESTING PERIOD: MEASURE 1			
7	6	CS	Same as lesson #5 with different numbers	DB, CT	One example with DB Introduction to CT Examples with CT One example with DB and CT
8	7	CS	Same as lesson #5 with different numbers	DB, CT	Half as many examples but all with both exemplars
9	8	CS	Expanded notation up to 99; standard and nonstandard	CT	Same as SE except use CT instead of CS
10		TESTING PERIOD: MEASURE 2			
11	9	CS	Expanded notation up to 499	CS, DB and CT	Fewer examples but all with the three exemplars
12	10	CS	Expanded notation up to 999	CS, DB and CT	Examples with the three exemplars
13		**TESTING PERIOD: MEASURE 3**			
		RETENTION PERIOD			
20		TESTING PERIOD: MEASURE 4			

CS: Coffee stirrers
DB: Dienes' base-ten blocks
CT: Chips from Chip Trading Activity

Figure 1. Outline of treatments including testing periods.

Treatment

Group A was randomly assigned the multiple embodiment treatment (ME), group B the single embodiment treatment (SE). The treatments are outlined in Figure 1.

The physical models used with the ME group were coffee stirrers (prebundled into hundreds, tens, and ones), Dienes' base-ten blocks (flats, longs, and units), and chips from *Chip Trading Activities* (green, blue, and yellow). These models were chosen because they are among the materials typically used in elementary schools and are commercially available. They were also chosen and arranged in sequence after a categorization scheme suggested by Ashlock (1976). The only physical model used with the SE group was the coffee stirrers.

Instructional considerations such as choice of content, activities, and examples were kept parallel in both levels of the treatment except for the specific periods of time when the new materials were being introduced to the students in the ME group. During the corresponding period, the SE group was given extra examples to practice using their coffee stirrers. This was justified in that within a given time-frame a teacher would likely have to decide whether or not to provide more practice with one material (single embodiment) or to provide experience with more than one material (multiple embodiments). It should also be noted that each group was eventually presented with the same set of questions and exercises at the symbolic level. Children were frequently asked to explain their responses.

Each day immediately after the afternoon recess period, the children formed into the treatment groups. The investigator taught one of the treatment groups for 30 minutes. The other group went to physical education or music class. Then the investigator taught the second group while the first group took its turn to go to the physical education or music class. The order of teaching the groups was rotated so that each group was taught first on alternate days. Throughout any other time of the day and during the retention period both regular classroom teachers limited themselves to reviewing the basic addition and subtraction facts.

Further, it was decided to interview the teachers who had taught these present Grade 2 students when they were in Grade 1. The teachers indicated that they had extensively used sticks to teach "tens and ones." They had also made some use of a hundreds board and a number balance. One teacher stated that for a three-week period she used Dienes' blocks (flats, longs, and units) with her "bright" group. Further investigation revealed that of the students in that group, four were now in the ME treatment group and two were in the SE treatment group.

As the principal investigator taught both treatment levels, it was considered necessary to assess the extent of experimenter bias. Three observers, using Jones' (1976) affective behavior rating scale, rated his classroom behavior. Analysis of the results of the observations indicated there was no significant difference between treatment groups in the rank order of the instructor's behavior, nor in the proportion of the various behaviors.

Testing Procedures

Each treatment group was tested four times during the study (see Figure 1). At each testing period two tests were administered. The first test, the *Understanding Test* (UT), was an adaptation of Smith's (1973) *Place Value Mastery Test* (PVMT). The PVMT was validated by well-known specialists in

elementary school mathematics (see Note 1) and had a reliability coefficient range of .53 to .93 as determined by a series of pilot studies.

All questions on this test were presented at a symbolic level and were similar to questions actually considered in class. It seemed necessary to avoid using a test that contained questions presented at the concrete or pictorial level so as not to provide an advantage to the children in either of the treatment groups. The UT was limited to items involving at most three-digit numbers and was designed to provide a measure of achievement related to the concepts and skills actually learned during the instructional period. The second test, the *Transfer Test* (TT), was a modification of the UT and was limited to items involving four-digit numbers at the symbolic level. It was designed to provide a measure related to the ability of the student to generalize the grouping by tens concept, from two- and three-digit to four-digit numbers. Four parallel forms of both the UT and TT were prepared. Corresponding questions varied only in the specific number used.

Design

This study employed a "2 x 4 factorial design, with repeated measures on the time dimension" (Dayton, 1970, p. 264). For each set of measures (that is, from the UT and from the TT), group (or treatment) was the independent variable and existed at two levels, multiple embodiment (ME) and single embodiment (SE). The repeated measures with the UT and TT were the dependent variables and existed at four levels (measure 1, measure 2, measure 3, and measure 4). Both group and time were fixed effects; subjects was a random effect.

Results

Analysis of Data from UT

Table 1 contains a summary of the means and standard deviations of the scores for the two treatment levels across the four repeated measures. Table 2 contains the analysis-of-variance summary. Homogeneity of covariance and equicovariance were tested as they are requirements for designs involving repeated measures. Since the equicovariance assumption was not met, the critical F-value of 7.31 at the 0.01 level, with the 1 and 40 degrees of freedom (rather than 3 and 120) was used with the within-subjects sources of variance. As the main effect of Group in Table 2 was not significant at the 0.05 level, it was concluded that there was no difference between the overall mean scores of the two treatment groups. The Time factor was significant beyond the 0.01 level. This indicated that there was a significant linear trend over time with the repeated measures across both treatment levels implying that the instructional procedures were effective. That the Time-by-Group interaction was not significant suggested that the changes over time in both treatment levels were very similar. Examination of the results of a trend analysis of these data as reported in Table 3 confirms this finding.

Analysis of Data from TT

Table 4 contains a summary of the means and standard deviations of the scores for the two treatment levels across the four repeated measures. Table 5 contains the analysis-of-variance summary for the transfer data. In this case the conservative testing procedures for the within-subjects sources of variance was not used as the homogeneity of covariance and equicovariance assumptions were met. For 3 and 120 degrees of freedom, the critical F-value at the 0.01 level is 3.94.

TABLE 1

MEANS AND STANDARD DEVIATIONS OF THE UNDERSTANDING MEASURES FOR THE TREATMENT GROUPS ACROSS THE REPEATED MEASURES
(Maximum Score: 18)

Group	Measure 1	Measure 2	Measure 3	Measure 4
ME $\bar{X}_{ME}$	11.57	12.90	14.57	14.14
(sd)	(2.60)	(2.10)	(2.87)	(2.80)
SE $\bar{X}_{SE}$	10.90	12.38	13.86	13.48
(sd)	(3.42)	(2.73)	(2.97)	(3.80)

TABLE 2

ANALYSIS OF VARIANCE TABLE (UNDERSTANDING)

Source	*df*	SS	*MS*	*F*
Among subjects	41			
Group	1	17.36	17.36	.65
Subjects	40	1060.55	26.51	
Within subjects	126			
Time	3	225.10	75.03	27.06*
Group x Time	3	.21	.07	.03
Subjects x Time	120	332.69	2.77	
Total	167			

* $p<.01$

TABLE 3

TREND ANALYSIS OF THE REPEATED MEASURES VARIABLES (UNDERSTANDING DATA)

Source	Sums of Squares	Degrees of Freedom	Mean Square	*F*	Prob. *F* Exceeded
Time (1)	181.07	1	181.07	52.14	.00
Time (1) x Group	.02	1	.02	.01	.94
Time (2)	34.38	1	34.38	12.66	.00
Time (2) x Group	.02	1	.02	.01	.93
Time (3)	9.64	1	9.64	4.53	.04
Time (3) x Group	.17	1	.17	.08	.78

TABLE 4

MEANS AND STANDARD DEVIATIONS OF THE TRANSFER MEASURES FOR THE TREATMENT GROUPS ACROSS THE REPEATED MEASURES
(Maximum Score: 12)

Group	Measure 1	Measure 2	Measure 3	Measure 4
ME $\bar{X}_{ME}$	6.62	7.38	8.14	7.95
(sd)	(1.91)	(2.71)	(2.87)	(2.65)
SE $\bar{X}_{SE}$	7.33	8.00	8.00	8.76
(sd)	(2.08)	(1.94)	(1.92)	(2.34)

TABLE 5

ANALYSIS OF VARIANCE TABLE (TRANSFER)

Source	*df*	SS	*MS*	*F*
Among subjects	41			
Group	1	10.50	10.50	.65
Subjects	40	647.40	16.19	
Within subjects	126			
Time	3	45.02	15.01	8.02*
Group x Time	3	5.98	1.99	1.06
Subjects x Time	120	224.50	1.87	
Total	167			

* $p<.01$

The Group main effect in Table 5 was not significant; hence it was concluded that there was no difference between the overall means of the two treatment levels. That the Time factor was significant beyond the 0.01 level is an indication that there was a significant trend over time with the repeated measures dimension across both treatment levels. The interaction of Time-by-Group, however, was not significant, an indication that the growth pattern over time of the two treatment groups was roughly the same. Examine the results of the trend analysis for the transfer data reported in Table 6.

Discussion

One possible interpretation of these results is that it does not make any difference whether one uses three concrete exemplars or only one to teach these

numeration concepts to grade two pupils. This would be somewhat surprising in view of the importance attached to this concept by many educators.

TABLE 6

TREND ANALYSIS OF THE REPEATED MEASURES VARIABLES
(TRANSFER DATA)

Source	Sums of Squares	Degrees of Freedom	Mean Square	*F*	Prob. *F* Exceeded
Time (1)	42.98	1	42.98	17.29	.00*
Time (1) by Group	.12	1	.12	.05	.83
Time (2)	1.93	1	1.93	1.06	.31
Time (2) by Group	2.88	1	2.88	1.59	.22
Time (3)	.12	1	.12	.09	.77
Time (3) by Group	2.98	1	2.98	2.27	.14

* $p<.01$

Another possibility is that although differences might have been observed in either the understanding or the transfer results, either the measuring instruments were not sensitive enough or some other factor affecting both groups proved to be sufficiently strong so that differences between the treatment effects were not apparent. Two examples of such factors are time and type of questions asked. It is possible that the 13-day instructional period was too short to permit effective development of any generalization. It is also possible that the children in both groups were able to internalize the concepts more strongly as a result of constantly being asked to explain *why* they gave a particular answer (correct or otherwise).

It should be noted that one or more of the limitations of the study may have been strong enough to counteract the treatment effect. First, it is possible that a variable such as instructor-enthusiasm or instructor-clarity, or a variation of the Hawthorne effect, would have a strong effect on the achievement levels of both groups. This would be consistent with the findings of Brownell (1966) and Reys (1972). Both indicated that learning of mathematics is dependent more on the teacher than on the embodiment. A second limitation is related to the previous experience of both groups of children with the mathematics concepts studied and with the materials used. An area in which children could have had some experience that might affect their transfer test scores was their knowledge of four-digit numbers.

In summary, given the possible interpretations of the results of this study, it cannot be stated categorically that one should or should not use multiple embodiments to teach selected decimal numeration concepts to children in Grade 2. What must be noted, however, is that this study, like several others, does call into question the advantage of using multiple embodiments of a mathematical concept in the instructional process.

In future studies planned to investigate the use of manipulative materials in teaching place value concepts, perhaps the role that rational counting may have played in this study should be considered. Although there is no reason to believe that one group behaved differently from the other with regard to their use of

rational counting, it appeared that children in both groups tended to disregard any counting ability they may have had to help solve some of the problems. For example, one child had counted correctly by ones from 257 to 265. Several minutes later the child was shown a physical representation of the numeral 359 (3 hundred bundles, 5 ten bundles, and 9 single sticks). The child was then given one more stick and asked, "How many sticks do you have now?". It was a great struggle for the child to sort out the answer. This helps to provide some support for the contention of Payne and Rathmell (1975) that children need practice in translating from one representation of a number to another. One other illustration serves to question the role that counting played in the study. Many children could quite accurately read the numeral 410, yet when asked to write the numeral which comes after 409 when counting by ones, they wrote 4010. One might wish to note in this regard that Barr (1978), on the basis of his study with kindergarten children, recommended that instruction in rational counting should precede instruction in the grouping process.

Mathematics specialists were Edwina Deans, Vincent Glennon, Maurice Hartung, Charles Howard, Jo McKeeby Phillips, Alan Riedesel and Marilyn Suydam.

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Dissonant Feedback about Achievement and Teachers' Expectations

The impact of achievement test results on teachers' expectations was investigated using hypotheses derived from cognitive dissonance theory. It was predicted that test results would be accepted for underestimated students but that expectations would become more negative; for overestimated students, it was predicted that test results would be rejected with no impact on expectations. Thirteen Grade 6 teachers rated 285 students in a pretest-feedback-posttest design with Solomon controls. Teacher expectations showed very little change as a result of achievement test feedback, and test results for both under- and overestimated students were rejected.

Despite obvious limitations and enduring criticism, achievement testing remains an integral part of the education of most children. The present study was an attempt to gain insight into some of the factors which cause teachers to accept or reject test results, particularly those which are unexpected. Specifically, there is reason to believe that, in some cases, teachers will reject disconfirming test results, while in other cases the teachers' opinions of the student will change. In fact, there are reasons to hypothesize that unexpected high levels of achievement might cause perceptions of some students to become even more negative. One aspect of the Rosenthal and Jacobson (1968) study of teacher expectations which has remained largely ignored relates to the perceived personality adjustment of children who "bloomed." Rosenthal collected judgments about pupils' adjustment towards the end of the school year, at the end of the study. Children in the experimental group, who, on the average, gained more in IQ, were rated as being more interesting, better adjusted, more appealing, more affectionate, happier, more curious, and as having potentially more successful futures. However, IQ gains were not always paralleled by more favourable ratings on adjustment measures. Children in the experimental group who showed IQ gains and who were in middle

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or upper track classrooms were rated as being less hostile, but also as being *less* happy, affectionate, and adjusted. Thus, they appeared to have lost some advantage in their teachers' eyes. It appears that IQ gain corresponds to more favourable evaluation only when the IQ gain is expected.

Similarly, children in the control group who were in slow track classrooms and who gained in IQ were rated more negatively than those children whose IQ gains were expected. In fact, they were rated even more negatively than the middle and upper track controls: they were perceived as *less* interesting, curious, adjusted, appealing, happy, and affectionate. For these children, the more they gained in IQ, the more unfavourably they were rated by the teacher. As Rosenthal and Jacobson state, "there may be psychological hazards to unparalleled intellectual growth" (1968, p. 118). This notion of the negative effect of positive unexpected gains largely disappeared from the literature, and given the methodological and statistical weaknesses cited by numerous critics (e.g., Baker & Crist, 1971), it is impossible to draw conclusions from the original study. This phenomenon has been directly investigated in only one subsequent study (Shore, 1969).[1]

Shore asked 26 teachers to rate all their male students ($N=312$) on a ten-point scale, predicting their performance on a state-wide intelligence test. At the same time, each teacher completed an 18-item behaviour rating scale for each student. These two measures constituted the pretest situation. After an interval of one month, the teachers were presented with the results of the intelligence test, and again were asked to evaluate their students on the behavioural scale. Independent variables analyzed in this study were the IQ expectancy, and the discrepancy between predicted and reported IQ. The dependent variable was the change in behavioural evaluations.

From the cognitive dissonance theory, Shore derived four hypotheses:

1. confirmation of a positive expectation will cause a positive behavioural evaluation
2. disconfirmation of a positive expectation will cause a negative evaluation
3. confirmation of a negative expectation will cause a positive change, or there will be no change in evaluation, and
4. disconfirmation of a negative expectation will cause a negative change in evaluation.

All four of Shore's hypotheses were supported by the data.

Interpreting the Effects of Discrepant Information: Dissonance Theory

The findings that unexpected improvements in performance may produce negative evaluations of students on other characteristics are paradoxical. If a teacher is committed to children's learning, we would expect that gains in IQ or achievement would be rewarding to the teacher, and that perceptions of children who unexpectedly improve would be more positive. However, this may not be the case. Thus, the theoretical issue of importance to the present research relates to the impact of new information, especially discrepant information, on the maintenance and alteration of existing expectations.

The most parsimonious way to conceptualize this phenomenon would appear to be in terms of cognitive dissonance theory (Festinger, 1957). Specifically, dissonance theory allows for prediction of a "boomerang" effect (Cohen, 1962):

> If various cognitions are highly resistant to change, then the individual may resort to bolstering the cognition he first held (as a means of dissonance reduction). (Brehm & Cohen, 1962, p. 56)

When achievement test results conflict with the teachers' expectations, dissonance theory posits that there will be an attempt to reduce the induced dissonance. How will this be accomplished? Consider two hypothetical cases, where a teacher receives achievement test results which violate his/her expectations for achievement. This dissonance-producing event will be the result of an inaccurate expectation which can have one of two directions: overestimation of the child's ability, or underestimation of ability.

In either case, dissonance reduction necessitates one of two processes: either the teacher must reject the dissonance-producing information, or the teacher must alter the cognition about the particular child. This means that the teacher must either reject the feedback about test results, or alter the expectations about the child.

However, it is reasonable to hypothesize that dissonance relating to children who are overestimated will be reduced in a fashion different from dissonance about children who are underestimated. The achievement level of pupils is but one of many dimensions of importance to the teacher in a classroom, and this expectation is but one of many elements in a constellation of attitudes towards each child. These elements, or perceptions about individual children, will be maintained in a relatively consistent manner, having been previously integrated by one of the two methods of dissonance reduction described above. Thus, a classroom teacher has expectations about achievement *and* other facets of importance in the classroom, but these do not exist in an unintegrated fashion. Rather, they exist as *consonant* cognitions, and we might consider that the achievement expectation is embedded in a larger constellation of attitudes towards the individual. It is the embeddedness in other expectations which renders the particular expectation about achievement resistant to change. Festinger (1957) noted that:

> To the extent that the element is consonant with a large number of other elements, and to the extent that changing it would replace these consonances with dissonances, the element will be resistant to change. (p. 27)

Since it appears that there are a large number of factors which enter into teacher expectations (see, for example, Braun, 1976), we can assume that expectations about a particular child will be well-formed and will be resistant to change. Thus, the particular method utilized for dissonance reduction may well depend on the nature of the dissonant information.

Considering the case of children whose achievement levels are overestimated by teachers, we can hypothesize that these children are somewhat favoured by the teacher. In general, the teacher will have a relatively positive attitude to these children, and this positive attitude will be resistant to change. Furthermore, it is relatively easy to explain away unexpectedly low test results: the child didn't feel well that day, or was tired, or misunderstood the test instructions, and so on. In this case, then, it is easier to reduce the dissonance by rejecting the test results than by altering the perception of the child.

On the other hand, the child whose abilities are underestimated might be viewed as a child who is in relative disfavour with the teacher. The teacher will hold a constellation of more or less negative attitudes to, and expectations about, the particular child, and these negative attitudes are resistant to change. However, it is not as reasonable to reject the test results in this case: what circumstances would lead to unrealistically *high* test results? To believe any one of a number of other possibilities is to introduce other forms of dissonance, particularly if we wish

to avoid blaming the child. For example, we would have to believe in many unlikely possibilities (the computer made a mistake in scoring, or the child's answer sheet got mixed up with someone else's). Direct child-blaming explanations seem more plausible: the child cheated on the test, or that he/she has a personality conflict with the teacher and isn't motivated in class, but is motivated on a standardized test. This is not to say that direct child-blaming is necessary to reduce the dissonance, only to suggest that it is one possibility. In general, then, it is reasonable to assume that in this case the test results are less likely to be rejected, but in order to maintain an overall negative image of the child, other traits will come to be viewed in a more negative fashion.

Following, then, are the major hypotheses which were tested in the study:

1. Confirmation of achievement predictions, and disconfirmation of *underestimated* achievement predictions will lead to acceptance of test results; disconfirmation of *overestimated* achievement predictions will lead to rejection of those test results.
2. Confirmation of achievement predictions, and disconfirmation of *overestimated* achievement predictions will produce no shift in expectations; disconfirmation of *underestimated* achievement predictions will produce a negative shift in expectations.

It will be noted here that the present study extends the study by Shore in several ways. First, Shore's theoretical background was derived largely from learning theory; according to this theory, vicarious reinforcement for the teacher should occur when a pupil is successful academically. Thus, for Shore, a negative expectation occurred when the teacher had *low* expectations for the child's score on an intelligence test. In Shore's study, "success," high IQ, and positive expectations are all equated. In the present study expectations are defined in a somewhat different sense: an expectation is negative only if the child performs *better* than the teacher had anticipated, recognizing that teachers may judge children of varying abilities quite differently. For example, teachers might hold positive expectations towards motivated, well-behaved, quiet children of low ability.

Second, the present study differs from Shore's in that Shore focused his outcome measures only on teacher attitudes towards the child. In the present study the focus is more directly on the processes of dissonance reduction, that is, on the circumstances in which teachers change their opinions about children or choose to accept or reject the dissonance-inducing feedback.

Method

The primary purpose of this study was to determine the effects of discrepant information on expectations. In order to assess this effect, teachers were given feedback from standardized test results, and these results were compared to earlier predictions the teachers had made for specific students. An expectation questionnaire was administered in a pretest-posttest design to assess the impact of this feedback on expectations.

The study was carried out in a natural setting, and had both a quantitative and qualitative aspect. In the quantitative portion of the study, a Solomon four-square design (Solomon, 1949; Solomon & Lessac, 1968) was used in order to control for confounding effects of pretest and feedback. A random sample of

teachers was selected, and within each class, a number of target students were randomly selected.

In the qualitative portion of the study, a selected number of teachers were interviewed to determine teachers' awareness of dissonance-reduction processes, and how rationalizations are formed to justify dissonance-reduction.

Participants

Participants were 13 randomly selected Grade 6 teachers from 10 schools in a medium-sized city in Atlantic Canada. Given the small original pool of 23 teachers from which 13 teachers were chosen, it was not possible to control for teacher gender. The final sample consisted of nine male teachers and four female teachers. Each teacher rated a number of target students in his/her classroom, creating a sample of 285 students after sample attrition. Data were gathered on 148 males and 137 females; there were 36 students in each of the three Solomon control groups (no pretest-feedback, pretest-no feedback, no pretest-no feedback) and 177 in the treatment group.

Procedures

First Phase

To evaluate the effects of discrepant feedback on teachers' expectations within a natural context, the study was set within a province-wide standardized testing program using the Canadian Tests of Basic Skills (King, 1974) that took place in late October, 1979. Results for these tests are computer-scored outside the province, and therefore are not available to teachers until months later.

In the first phase of the study, which was carried out at the end of January, teachers were asked to predict results on CTBS for each target student. To make the prediction about achievement, the CTBS Composite score was used, since it represents an overall average from all CTBS subtests, and was assumed to measure general achievement. Teachers made their ratings on a seven-point scale, and the item appeared as follows:

1. You will recall that last fall your pupils took the *Canadian Tests of Basic Skills*. Please estimate this pupil's *Composite* (that is, total, or overall average) score.

very much below average for his/her grade level	1
moderately below average	2
a little below average	3
average for his/her grade level	4
a little above average	5
moderately above average	6
very much above average	7

In addition, teachers completed an expectation questionnaire for each student. This formed the pretest data in assessment of the effects of discrepant feedback on expectations.

Second Phase

This phase of the study was carried out at the beginning of April, when CTBS results were made available to the school district. CTBS scores were not available to the sampled teachers independently of the researcher until after the study had been completed.

To provide feedback about CTBS results to teachers, a form was sent to teachers with each student's provincially-normed Composite scaled score, followed in brackets by a transformation of this score into the same seven-point scale used in the CTBS prediction from phase one.[2]

Teachers' predictions were then compared with the CTBS Composite scores. To ensure that any discrepancy would be noted by teachers, it was presented in two ways: first, as a numerical comparison, and secondly, as a verbal comparison. If the observed score was greater than the predicted score, the predicted score was termed "underestimated." If the predicted score was greater than the observed score, the predicted score was termed "overestimated." If the two scores were equal, the predicted score was termed "accurately estimated." One of these three labels was noted on each student's test results.

The comparison of predicted CTBS results with actual test results was followed by two items measuring acceptance/rejection of the test results, and the sixteen-item expectation questionnaire. No alterations were made to the expectation questionnaire between the first and second phases of the study. All groups received the posttest questionnaire, while only the experimental group and one Solomon control group received the test feedback.

Third Phase

After data analysis had been completed, six teachers were selected for interviewing. These six teachers were selected on the basis of having under- or overestimated the achievement levels of the largest number of their students. These teachers, all male, were interviewed in their schools, at their convenience; interviews lasted about one hour and were tape-recorded.

A semi-structured interview procedure was followed. Interview questions were based on the findings of the study, and teachers' understandings, insights, and interpretations were solicited. The interviews probed teachers' awareness of inconsistencies in their reasoning and their dissonance-reduction processes.

Instrumentation

CTBS prediction. The Canadian Tests of Basic Skills (King, 1974) are a widely-used battery of achievement tests with Canadian norms developed on a national standardization sample of over 35 000 children. At the Grade 6 level, split-half reliabilities for the Composite score are +.98.

Expectation questionnaire. Based on a survey of past literature in the area, an expectation questionnaire was designed for the present study. Sixteen items were included on the scale, eight to measure cognitive expectations, and eight to measure normative expectations. *Cognitive* expectation measures included: predictions of Grade 7 average; ultimate educational attainment and ultimate occupation; estimates of IQ, speed of learning, and over- or underachievement; and ratings of curiosity and retention of new material. *Normative* expectation measures were ratings of motivation, relationships with other pupils, conduct, attitudes towards school, cooperativeness, ambition, work habits, and attentiveness. Fourteen of these items were five-point scales, while two (predicted educational attainment and predicted occupation) were seven-point scales.

Measure of acceptance/rejection of test results. Criticisms of cognitive dissonance theory have appeared in recent literature where the point is made that it is possible to derogate sources of high credibility (Maile & Kizilbash, 1976), as well as sources of low credibility. In the present situation, for example, it may be

important to know how teachers *generally* rate the credibility of test results. This level of general credibility may vary widely from teacher to teacher; hence, comparison of levels of credibility of *specific* results may be meaningless. It was decided to pose two questions to determine acceptance or rejection of test results: the first question related to confidence in the accuracy of the specific student's test results; the second related to the degree of confidence required before the teacher would believe the test results. Ratings on both items were on a five-point scale (1=very confident, 5=not at all confident). In the data analysis, the response to the first item was subtracted from the second to yield a single score. Negative scores indicate rejection of test results, while neutral or positive scores indicate acceptance.

Results

Solomon tests for effects of pretesting, effects of feedback alone, and stability of expectations over time were carried out by means of a series of pooled-variance *t* tests for independent samples on the expectation items. None of the resulting 48 *t* tests was significant, and therefore differences within the experimental group can be interpreted with the assumption that, whatever effects may be present, they are due to the treatment and not to confounding effects.

Once the Solomon tests had been completed, the subsample of most discrepantly estimated students was selected from the 177 students in the experimental group. As noted earlier, CTBS scaled scores were translated into a seven-point scale corresponding to the scale used for achievement predictions. Fifty-eight students who were only marginally over-or underestimated (that is, less than one translated score point) were eliminated from the data analysis. The final subsample size was 47 underestimated, 55 accurately estimated, and 17 overestimated students.[2] If the 58 eliminated students and the 55 accurately estimated are combined, we find that teachers were able to estimate reasonably well the achievement levels of 113 students, or approximately 64%.

Residual scores for each pupil were calculated for the test acceptance/rejection measure and for all expectation measures. Residuals were then submitted to an hierarchical analysis, with variance due to differences between teachers removed in the first step. In the second step, variance due to differences between assigned discrepancy ratings was analyzed. Since teachers for the present study were randomly selected from an available pool of Grade 6 teachers, no attempt was made to control for teacher characteristics of possible importance in expectancy formation, and although the variance is accounted for, it will not be discussed in the present paper. Preliminary experimental-setting research on teacher characteristics of importance in expectation formation is reported elsewhere (Bognar, in press). However, because of the possibility of differences between teachers, the hierarchical analysis was performed.

Hypothesis 1 concerned the effects of discrepant feedback on test acceptance/rejection. In order to test this hypothesis, an hierarchical analysis of variance was carried out as described above. The two items to measure this variable were "How confident are you that this pupil's test results accurately reflect his/her achievement levels?" and "How confident would you have to be before you believed the test results?" These two items were combined by subtracting the first from the second to yield a single score. Positive scores indicate acceptance of test results, negative scores indicate rejection. Means, standard deviations, and results of the analysis of variance are presented in Table

1. As will be noted from the table, differences between teachers were significant, $p<.001$. With variance due to teachers removed, there were also significant differences between test acceptance/rejection by discrepancy group, $p<.001$. An inspection of the means indicates that test results were accepted for accurately estimated students, and rejected for overestimated students, as predicted. However, test results were also rejected for underestimated students; this was contrary to the hypothesis.

TABLE 1

MEANS AND STANDARD DEVIATIONS BY DISCREPANCY GROUP
TEST ACCEPTANCE/REJECTION

	Mean	SD	N
Underestimated	-0.532^{a}	2.115	47
Accurately estimated	$+0.473^{a,b}$	1.399	55
Overestimated	-1.059^{b}	2.331	17

$F_{\text{teacher}} = 7.77$, df = 12,118, $p<.001$

$F_{\text{discrepancy group}} = 21.52$, df = 2,118, $p<.001$

^{a}differences between means significant, $p<.001$

^{b}differences between means significant, $p<.05$

Hypothesis 2 concerned the effects of discrepant feedback on expectations. Pretest comparisons illustrated that all sixteen measures discriminated between the three discrepancy groups. F ratios for these comparisons, with (2, 118) degrees of freedom, ranged from 28.87 to 441.37, all $p<.001$. Interactions of teacher by discrepancy group were significant for four of the sixteen variables: attitudes to school, predicted Grade 7 achievement, predicted ultimate education, and retention of new materials. F ratios for these interactions, with (19, 118) degrees of freedom, ranged from 1.72 to 1.92, all $p<.001$. It appears probable that these differences can be accounted for by the varying proportions of students in each discrepancy group in different classrooms. On two additional measures, predicted cooperation and expected classroom conduct, there were significant differences in ratings between teachers. The F ratio for cooperation was 2.91 with (12, 118) degrees of freedom, $p<.01$; for conduct the F ratio was 1.90 with (12, 118) degrees of freedom, $p<.05$.

On only four variables were there significant shifts in expectations for the discrepancy groups after variance due to teacher differences was removed. These four expectation measures were peer relations, predicted ultimate education, speed of learning, and classroom conduct. Because of the significant teacher by discrepancy group interaction for classroom conduct, this effect will not be interpreted. For the three remaining variables the F ratios were 3.42, 4.74, and 10.34 respectively, all with (2,118) degrees of freedom; the first two F ratios are significant, $p<.05$, the third $p<.001$.

Since only three of the sixteen hierarchical analyses of variance illustrated significant shifts in expectations as a result of test feedback, there is little support

for hypothesis 2. Furthermore, an inspection of shifts in means disconfirms the directional predictions of the hypothesis. It was predicted that disconfirmation of underestimated achievement would produce increasingly negative expectations, while disconfirmation of overestimated achievement would produce no shift in expectations. However, for 14 of the variables, expectations shifted in the direction suggested by the test results, that is, expectations became slightly more positive for underestimated students and slightly more negative for overestimated students. On the variable classroom conduct, this pattern was not followed: expectations for conduct became slightly more negative for both underestimated and overestimated students.

Discussion

Only three of the sixteen expectation questionnaire items showed any change as a result of dissonant feedback; furthermore, for the underestimated group, changes on these items were not in the direction predicted. For this group, the prediction was that expectations would become more negative, while in fact they became more positive. Thus, these three items showed changes of expectations in the direction suggested by the test results; the expected "boomerang" effect (Brehm & Cohen, 1962; Cohen, 1962) did not occur.

In contrast to the expectation variables, where there were few effects, the effects on the test acceptance/rejection measure were marked. Where students were accurately estimated, and therefore the test results confirmed the teacher's prediction, test results were accepted. Where test results disconfirmed the teacher's prediction, test results were rejected. This was contrary to the hypothesis that disconfirmation of overestimated test results would lead to rejection of test results, while disconfirmation of underestimated test results would not. This hypothesis was derived because of the theorized difficulties in rejecting unexpectedly high test results, while many factors could be cited to explain away unexpectedly low test results.

Since the unexpected test results were uniformly rejected, it is consistent with dissonance theory to conclude that dissonance was aroused and reduced. However, the predicted "boomerang" effect was based on the assumption that the discrepant information would be accepted; since the information was clearly rejected, the boomerang effect could not occur.

One factor in rejecting incoming dissonant information is the degree to which the various cognitions in question are interrelated (Cohen, 1962). In light of this, it is not surprising that teachers tend to reject disconfirming test results that conflict with their opinions about students. Consider the following statements from one teacher:

> We look at a total assessment of the student . . . it's a test, it's one test . . . I know, because of their performances in the past, and what they've done over the past four or five years, what the student does.

Thus, the context within which discrepant information is evaluated is of crucial importance; teachers' expectations are the product of intensive, long-term, and continuing interactions with students.

This discounting of disconfirming test results produces two paradoxes, however: first, that test results from a single source — that is, standardized tests administered and scored under controlled conditions — can be accepted for some students, but not for others; and second, that different reasons must be

constructed for explaining discrepancies for overestimated and underestimated students. In order to explain the first paradox, teachers use their knowledge of extraneous factors which might influence the validity of test results. For example, one teacher commented:

> For those that are below [expected achievement levels] I say, well, that youngster could have been sick, wasn't feeling motivated that morning . . . I say there's got to be something wrong with the test . . . or something wrong with the child at that particular time.

Additionally, the rejection of some test results appears to be related to the teacher's self-esteem in his/her professional role:

> If you have any confidence in your teaching at all, you have to question that result . . . you have to question that score, for your own sanity.

These explanations are relatively predictable methods of dissonance reduction under the circumstances of overestimation of test results. In the case of students who were underestimated, dissonance reduction is less easily accomplished. Indeed, for many of the teachers, evidence of dissonance remains. In the interview data, there is little question that the test results are rejected, although the reasons for the rejection are not well integrated. One teacher, in discussing a specific case, marshalled evidence from other standardized tests to support his viewpoint that, in reality, the student was not performing well:

> She can perform on the CTBS, but for me she's not performing. My math tests, for example, are all standardized tests, not teacher-made tests, they come with the text . . . that vindicates me a little bit . . . I know she's not performing.

In another case, the teacher was able to reject the test results, but not without a great deal of ambivalence and conflict:

> I know he hasn't passed a test all this year, and he comes up with a 53 or 54 [slightly below average] . . . You can't help but question it. Maybe he's got good eyesight and the guy in front of him has a glass shoulder . . . You have to question that result, even though you're glad to see the child performed well on that test.

Since there are various means of reducing dissonance, a problem in dissonance theory is related to the difficulty in predicting dissonance reduction. Brehm and Cohen (1962) further specify this problem by stating that:

> It is theoretically possible to arouse dissonance in regard to some information relevant to a given attitude while failing to arouse dissonance in regard to other information that is consistent with the same attitude. (pp. 14-15)

For complex attitudes, such as a constellation of expectations about a given child, dissonance arousal resulting from dissonant cognitions in one specific area may not generalize to the more encompassing attitudes. In our study of the effect of discrepant feedback about achievement, then, dissonance may only be aroused in areas most directly related to achievement. For example, there were no shifts in expectations about IQ, perhaps a much more basic opinion about the child, suggesting that teachers hold more immutable ideas about these factors. It appears that the discrepant feedback clashes only with certain perceptions of the child, rather than with the teacher's overall concept of the child.

Implications

The lack of change in expectations as a result of test feedback raises many disturbing issues about teachers' perceptions of students; indeed, the general lack of responsiveness of expectations to discrepant feedback suggests the rigidity of expectations. While a case could be made that standardized tests are not

necessarily any more accurate than teachers' evaluations, it would appear desirable that teachers remain open-minded towards possible positive changes in some students. Receptivity to sources of information such as test results would seem to be important in maintaining this open-mindedness. Otherwise, a student may find it exceedingly difficult to break out of a low-achieving role, since the teacher may reject demonstrations of improved performance.

Notes

1. Similar findings were noted by Leacock (1969) for teachers' expectations for black and white students at various IQ levels. In addition, Rubovits and Maehr (1973) found a race x expectation effect on quality of student–teacher interactions. In both studies, gifted black students were least favoured by teachers.
2. In terms of the *translated* scores, 10 students were overestimated by one point, and 7 by two points; 13 were underestimated by one point, 27 by two points, and 7 by three points. The χ^2 statistic of the two groups with Yates' correction for the empty cell was 4.27, df = 2, n.s.

The research reported was part of the author's doctoral dissertation at the Ontario Institute for Studies in Education, Toronto.

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BOOK REVIEW

UNDERSTANDING EDUCATIONAL MEASUREMENT AND EVALUATION. *By Jerry Bergman.* Boston: Houghton Mifflin Company, 1981, 303 pp.

In the field of educational measurement and evaluation, a number of good texts are available. They tend to be similar with respect to topics covered, order of presentation, and language employed. *Understanding Educational Measurement and Evaluation* is presented by the author as a candidate for inclusion in the lengthening list of such texts.

The book is divided into four parts. The first, entitled Introduction, consists of three chapters touching on the historical background of testing, and testing as feedback for teaching. Part two, Tests and Testing, is made up of twelve chapters that deal with the various aspects of test development. A short chapter on standardized tests is also included. Part three, entitled Grading, Rating, and Social Measurement, is a catch-all consisting of four chapters. Such disparate topics as methods of assigning school grades, interest surveys, and sociograms are covered. The final section, part four, is entitled Statistics, and consists of four chapters on descriptive statistics.

The intended objectives of the tests are stated in the preface:

> *Understanding Educational Measurement and Evaluation* is a basic text that can be used in introductory testing and measurement courses at both the undergraduate and graduate levels. The standard topics of testing and measurement as they apply to both standardized and teacher made tests are treated simply and directly. Special effort is given to making fundamental information interesting and readily understandable without sacrificing technical accuracy and completeness.

These objectives, and they are worthy, are similar to those found in other texts in the field. A potential user of this text might wonder how the author can, in about 300 pages, deal with the same subject matter for which other authors require 500-700 pages. Topic-by-topic comparisons with other texts indicate that some matters have been dealt with very briefly; for example, the chapters on constructing multiple-choice tests and on item analysis are perfunctory and lacking in even the fundamentals. Other topics are omitted outright; for example, information on commonly used standardized achievement tests, and how to evaluate and select them for use.

Judged according to its own objectives, and according to what should be taught at the college level, the book is hopelessly inadequate. While the language is indeed clear and easy to comprehend, the organization is rather weak. Part IV, on statistics, appears to be an afterthought. Some of the concepts left to this last section could very well have been used when discussion focussed on such topics as item analysis, reliability, and combining grades. Other evidence of weak

organization is that reliability and validity are dealt with briefly in Chapter 4, then again in more detail in Chapter 13. In some instances concepts are used in discussion, but not defined until later. For example, "level of difficulty" of questions is referred to in Chapter 4, but the term is not defined until Chapter 9. Similarly, "predictive validity" is said to be desirable in an aptitude test (p. 145) but the term is not defined until later in the chapter.

The primary and unforgivable fault of the text, however, lies in the numerous instances of careless inaccuracies, definitions that are not quite right, errors of omission, and errors caused by apparent ignorance of the subject matter. In a careful reading of a good measurement text, a reader might expect to find one or two points of a very "picky" nature that are not completely accurate. In this book, the list ran to several pages, and many items involved fundamental errors.

Some of the careless errors include statements such as:

> On a discriminatory test, the ideal class average is approximately 50 percent correct (p. 70). With multiple-choice questions, guessing exerts less influence on the final score. With three choices the student will end up with about one question correct by chance. With four choices the student will also end up with about one question correct by chance. (This is a complete paragraph on p. 138. The intended meaning is a mystery.)

> A reliability coefficient is determined by calculating the correlation between obtained and estimated true scores on a given test (p. 153). Correlation coefficients are only estimates or, more precisely, averages (p. 154).

> Sometimes, though, a quarter is referred to as a quartile (p. 254). If there were 100 scores and the three scores of 70 ranked 87th, 88th, and 89th, respectively, all three scores would have a percentile rank of 88 (p. 258).

Other careless errors include a guessing formula that is wrong (p. 138), as is the formula for Pearson's *r* (p. 289).

Errors of a more serious nature are those that probably reflect lack of knowledge on the part of the author. Some examples are given below:

> Chapter 1 is entitled Measurement and Evaluation; A Background, however, there is no hint to how measurement and evaluation differ, if they do indeed differ. In a text purported to be "humanistic" (preface, p. xi) it is strange to see statements about evaluating people rather than traits. On page 4 reference is made to parents evaluating their children!

> The "definition" of a power test leaves the reader with a strong suspicion that the author does not know the meaning of the term. "Items vary in difficulty on power tests. Usually a quarter of the items are easy, half are of medium difficulty, and a quarter are very difficult" (p. 73).

> Suggestions for combining grades are misleading. There is no mention made of taking test variances into account (p. 190).

> No distinction is made between a percentile and a percentile rank. These two terms seem to be used interchangeably in the text (Ch. 21).

> The illustration of a frequency polygon (p. 261) is wrong.

The statement "the standard deviation is the average amount that a set of scores deviates from (the) mean" (p. 275) does not do much for the credibility of an author, nor does "A normal curve is *usually* unimodal" (italics added).

T scores and stanines are presented without any reference to normalizing a set of scores.

Computations of percentile ranks (p. 256) are generally close, but not accurate. This is because a percentile is considered to be a range, rather than a point.

The expression "slope of a perfect negative correlation" is used.

The book is not strong on presenting new ideas, in fact several matters dealt with are very out of date. For example, in this day and age of microcomputers and of placing computer terminals in schools, the hand methods of item analysis that are suggested are worthy of inclusion in a test of the 1950's. The discrimination index is perhaps worth mentioning in a measurement book, but omitting any reference to the point-biserial correlation or the biserial correlation is not forgivable.

The IBM 1230 answer sheet shown on page 137 is obsolescent, if not obsolete.

The IBM answer sheet punch, recommended for purchase (p. 135) was withdrawn from sale years ago.

Among the various books on measurement and evaluation, this book is at best in need of extensive revisions. The errors mentioned represent only a few of those encountered, but in addition, there are many questionable, if not actually wrong viewpoints taken.

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PREPARATION OF MANUSCRIPTS

1. All manuscripts must be typewritten, double spaced, and submitted in duplicate. An abstract of approximately 100 words in length, typed on a separate page, should be provided.
2. Tables must be numbered in Arabic numerals with the word 'Table' centered and in capital letters, e.g., TABLE 4. The heading of the table is to be centered below and typed in capitals. The format of tables should conform to the specifications in the APA Publications Manual.
3. Graphs and charts should be used only if essential. They must be carefully prepared on separate sheets in India ink, ready for reproduction. Graphs must be properly labelled using Arabic numerals, e.g., Figure 3.
4. Each table or figure should be presented on a separate page. The position of tables and graphs should be clearly indicated within the text by inserting at the relevent point the phrase (Insert Table 2 here).
5. References should appear in parentheses following the reference citing the author's name (unless the name appears in the text), the year of publication, and page number if appropriate. For direct quotations, the reference should be cited and the page number given in brackets before the final punctuation of the quotation. The references should be listed alphabetically by authors' last names at the end of the manuscript under the heading, *References*.
6. Explanatory notes, numbered consecutively and identified in the text with a superscript, may be included under the heading of *Notes*. They should be double spaced and placed at the end of the manuscript immediately preceding the *References*. The citing of references and quotations in the *Notes* should conform to the procedures outlined in No. 5 above.
7. Spelling shall conform to the *Oxford English Dictionary* or to the *Dictionary of Canadian English,* except in the case of direct quotations which must conform to the original. Editorial alterations will be made if necessary.
8. In matters of style, the APA Publications Manual is considered definitive.

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